

FIG. 1

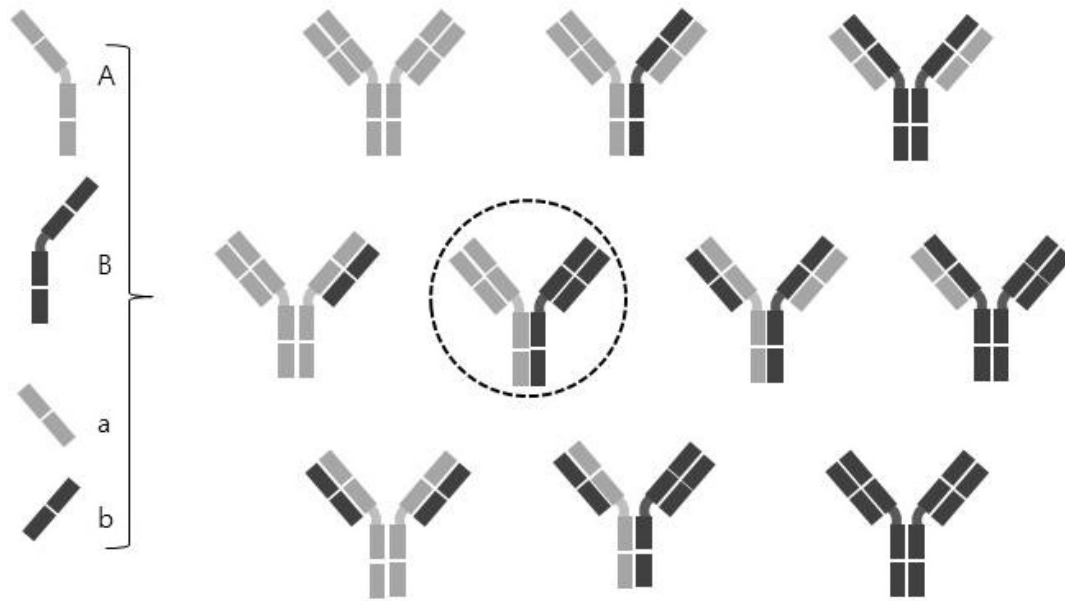


FIG. 2

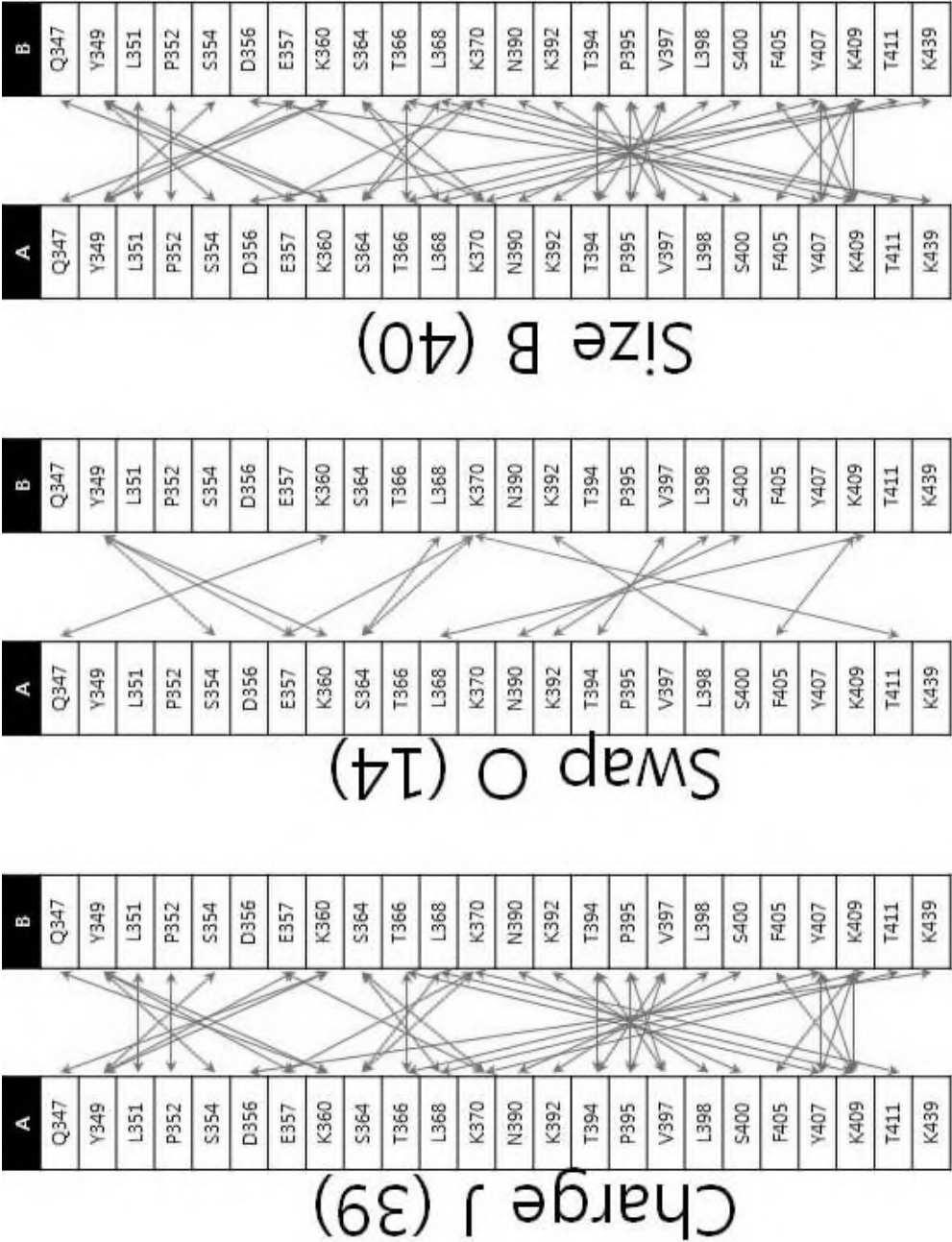


FIG. 3

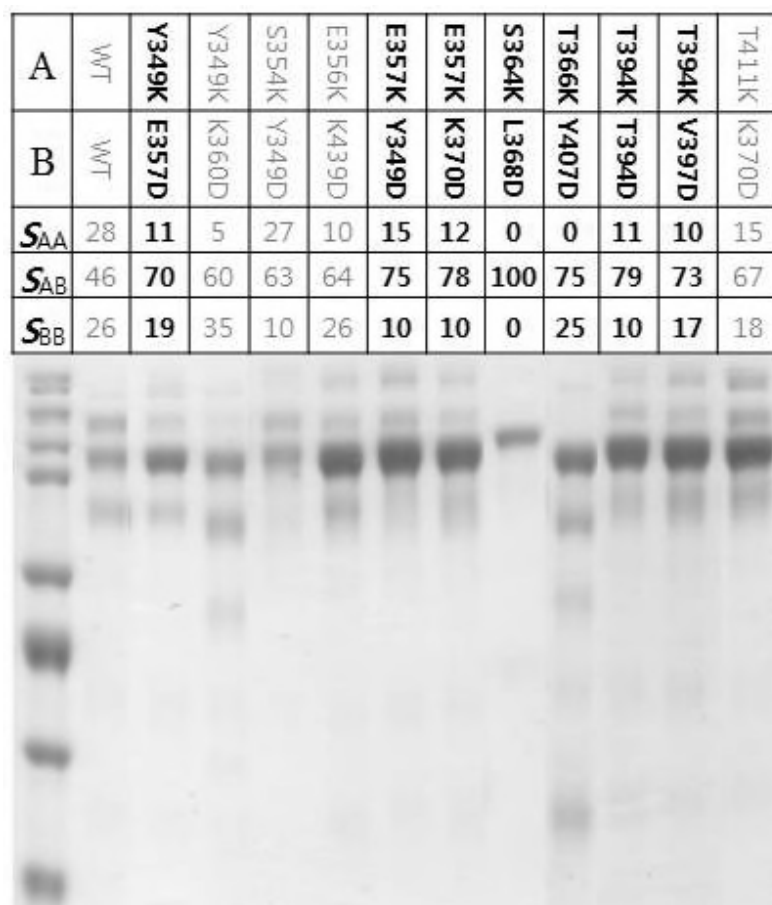


FIG. 4



FIG. 5

A	WT	K409W	K409W
B	WT	F405A	Y407A
S_{AA}	22	3	2
S_{AB}	56	60	85
S_{BB}	23	37	13



FIG. 6a

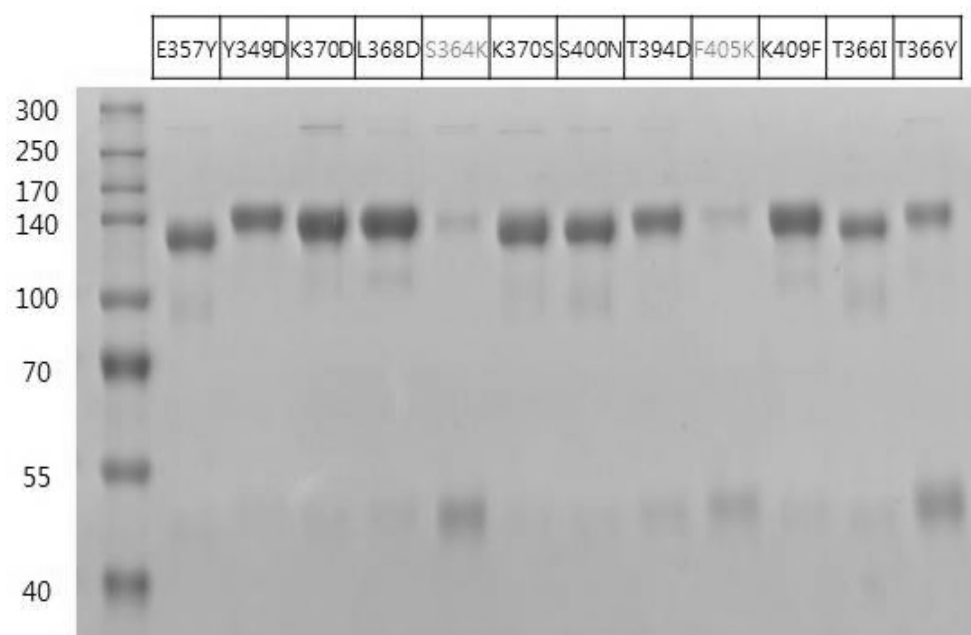


FIG. 6b

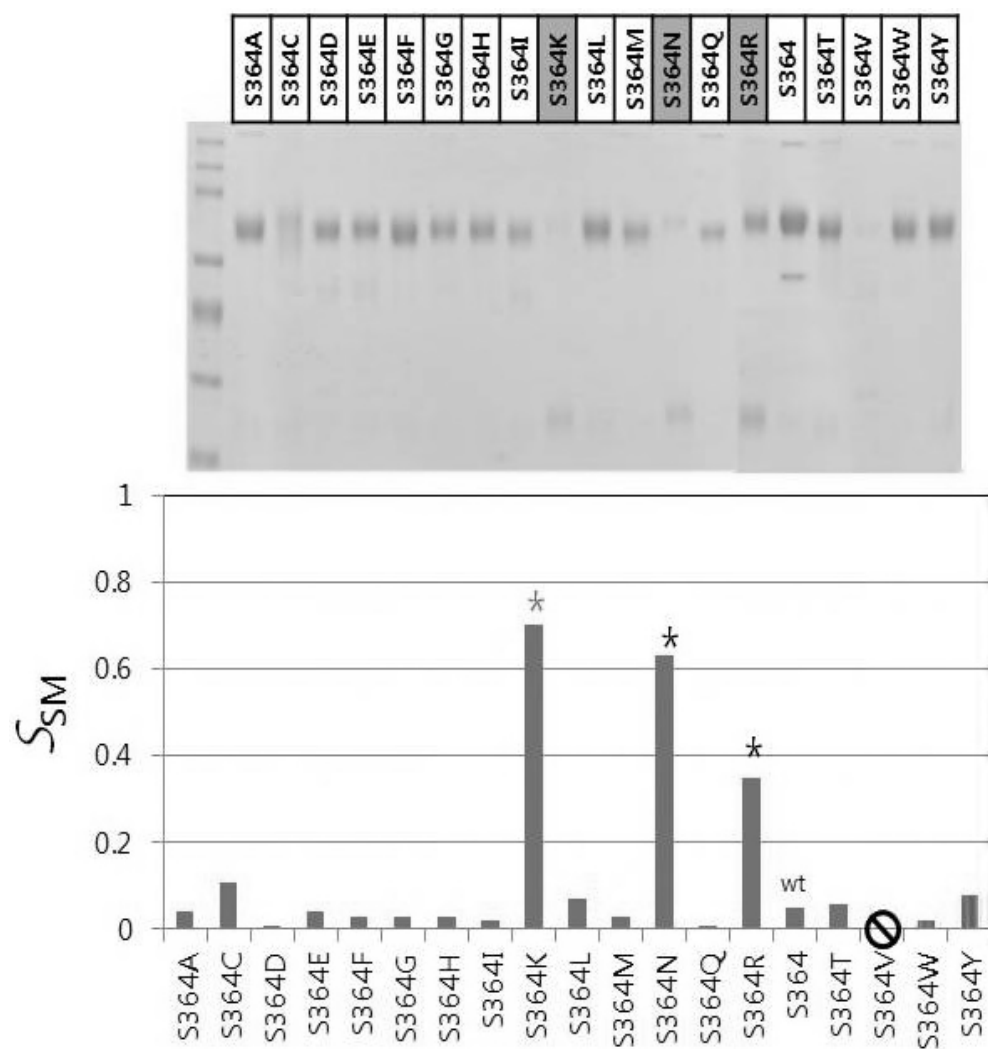


FIG. 6c

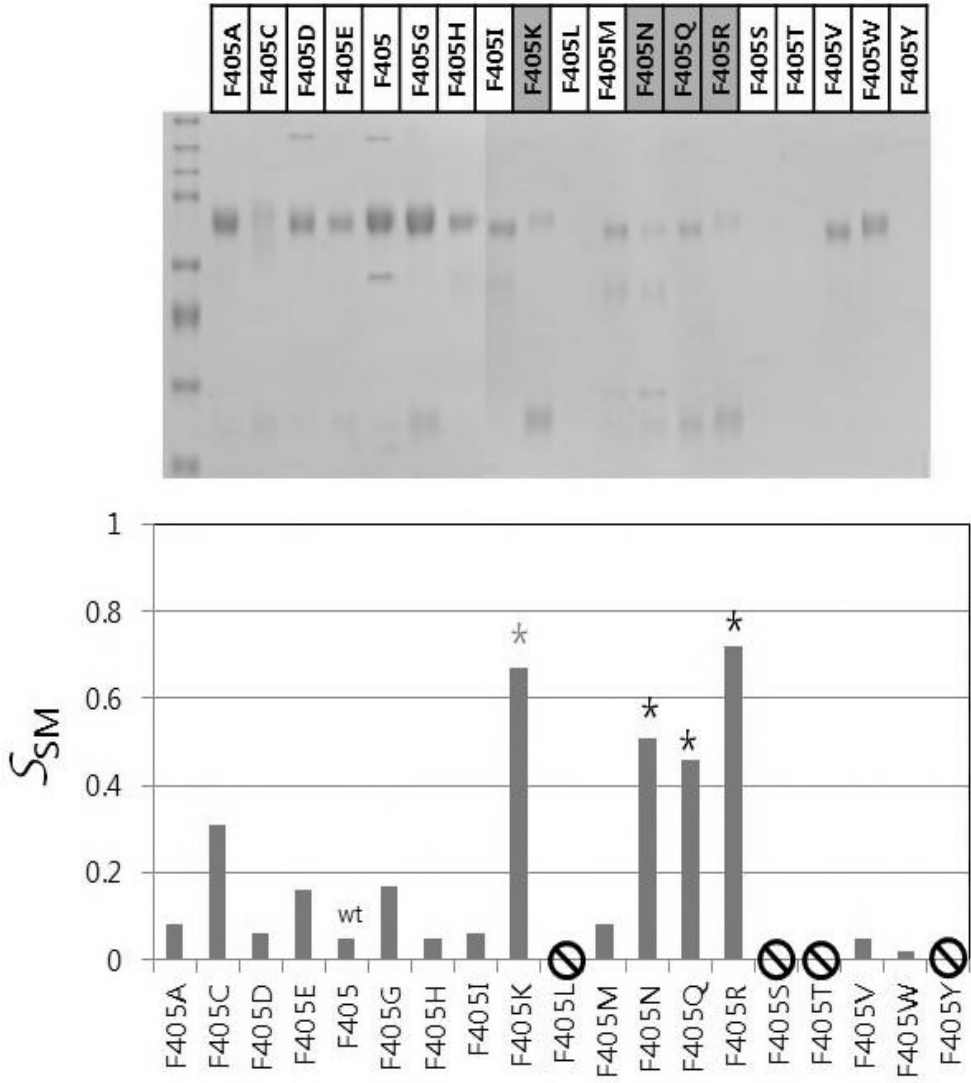


FIG. 6d

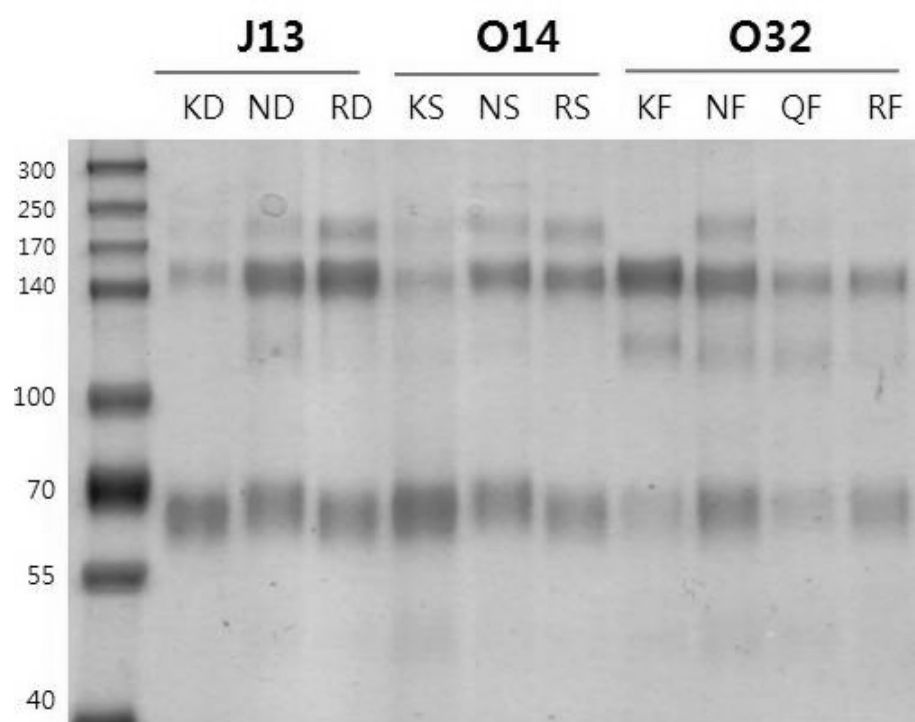


FIG. 7

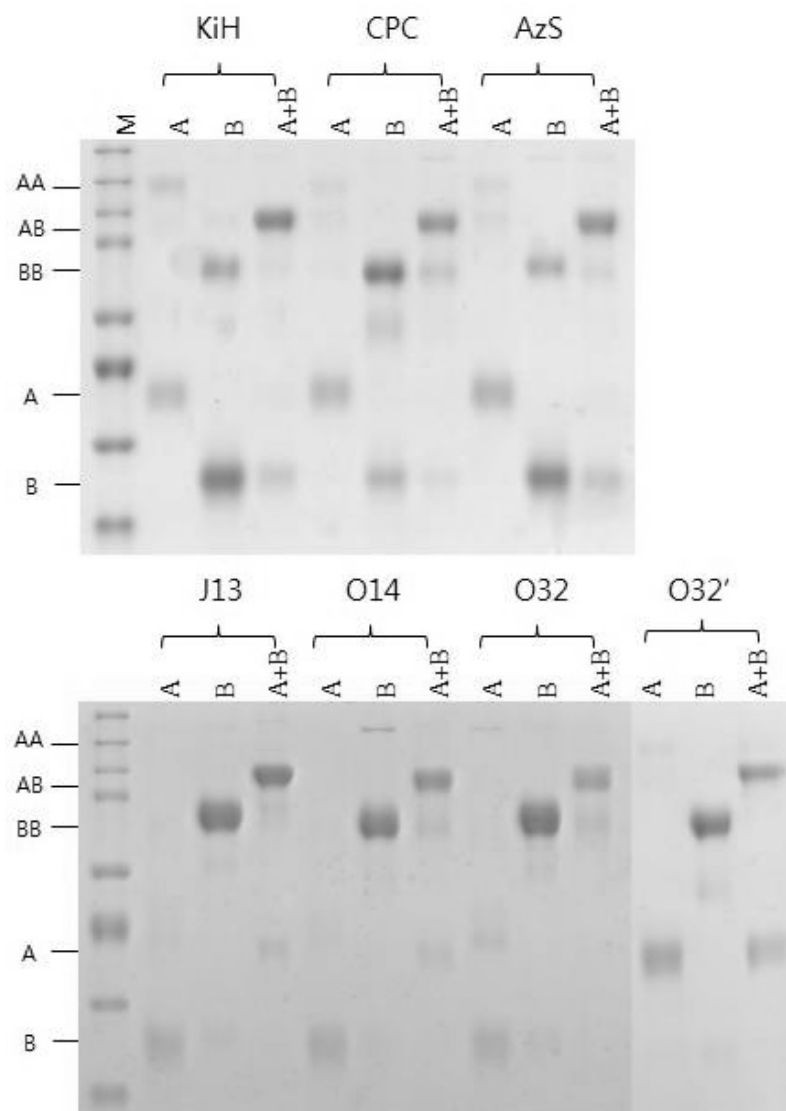


FIG. 8

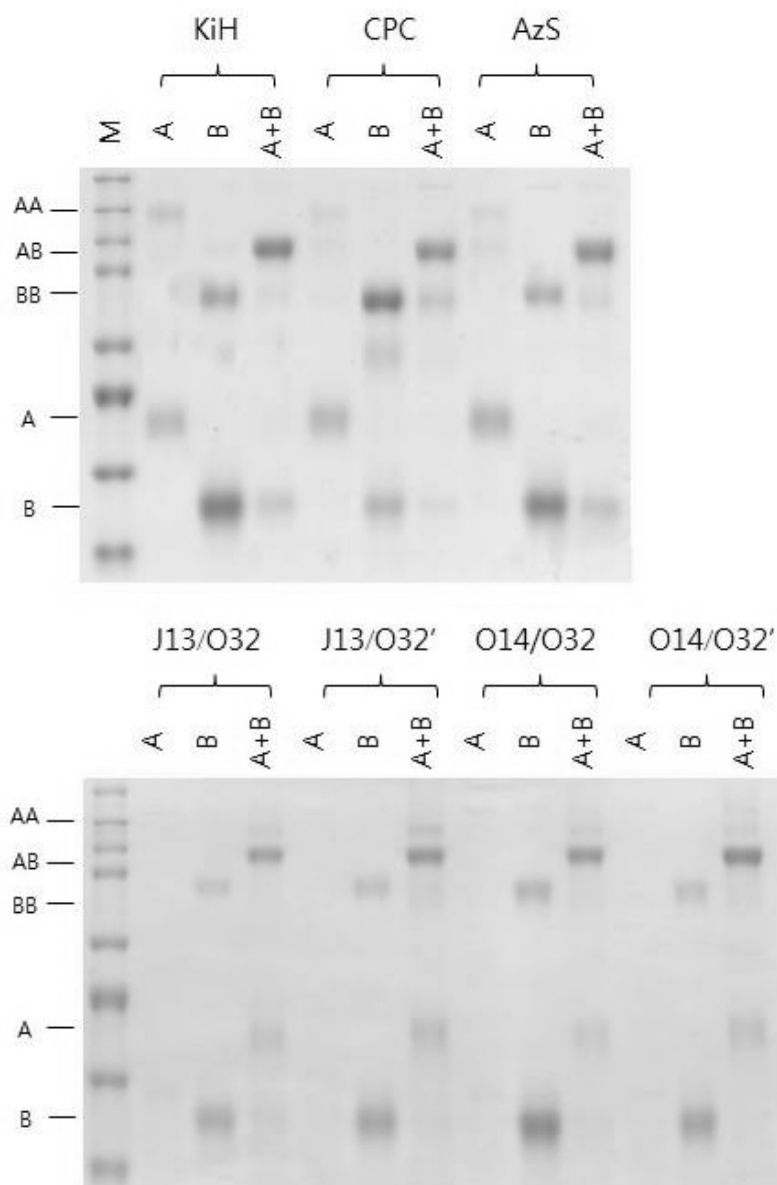


FIG. 9a

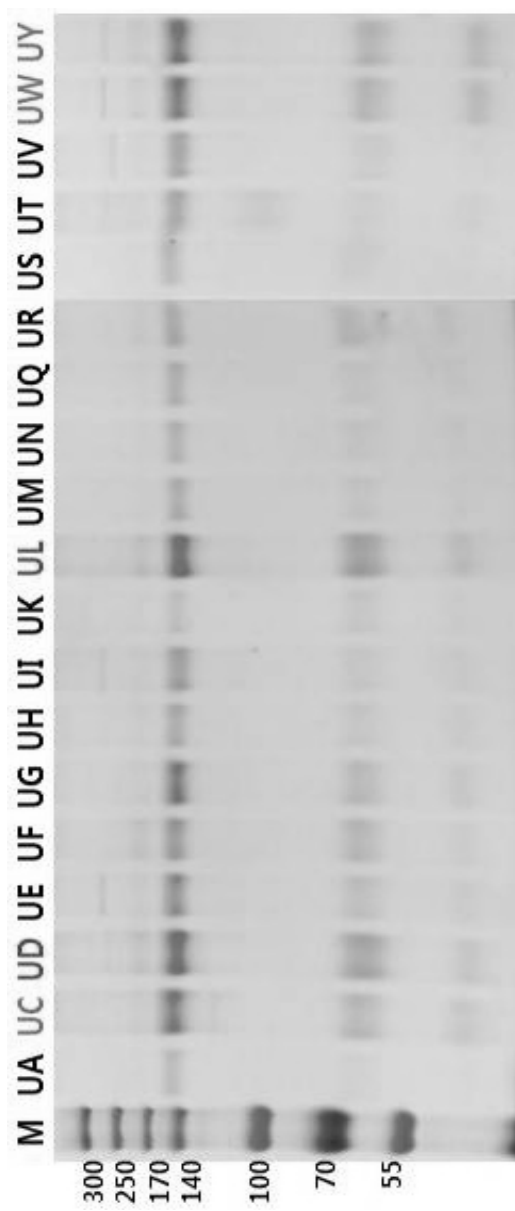


FIG. 9b

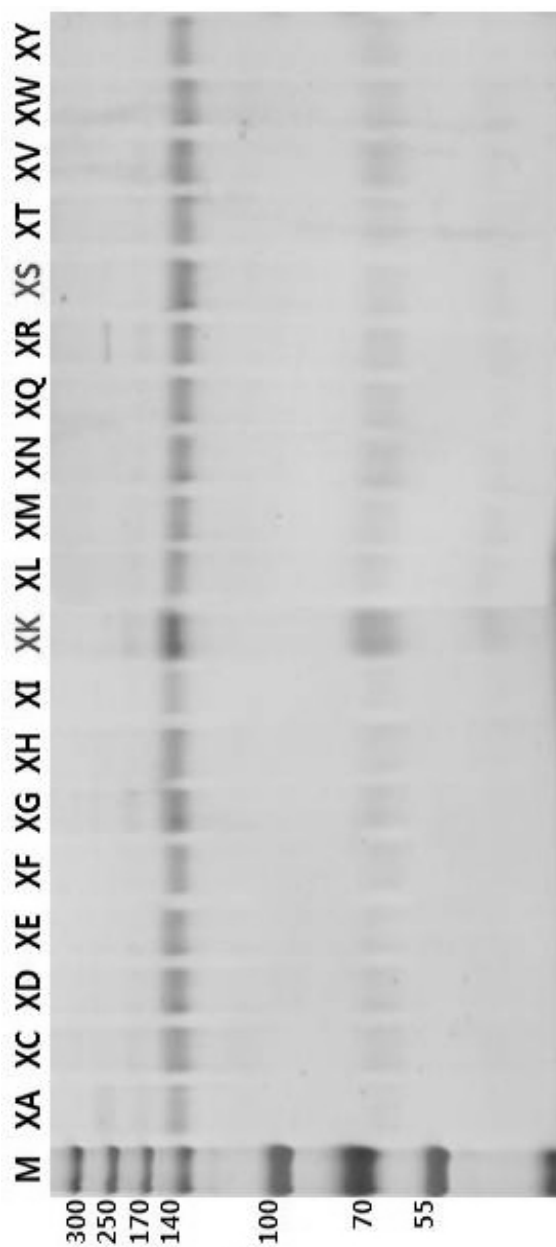


FIG. 9c

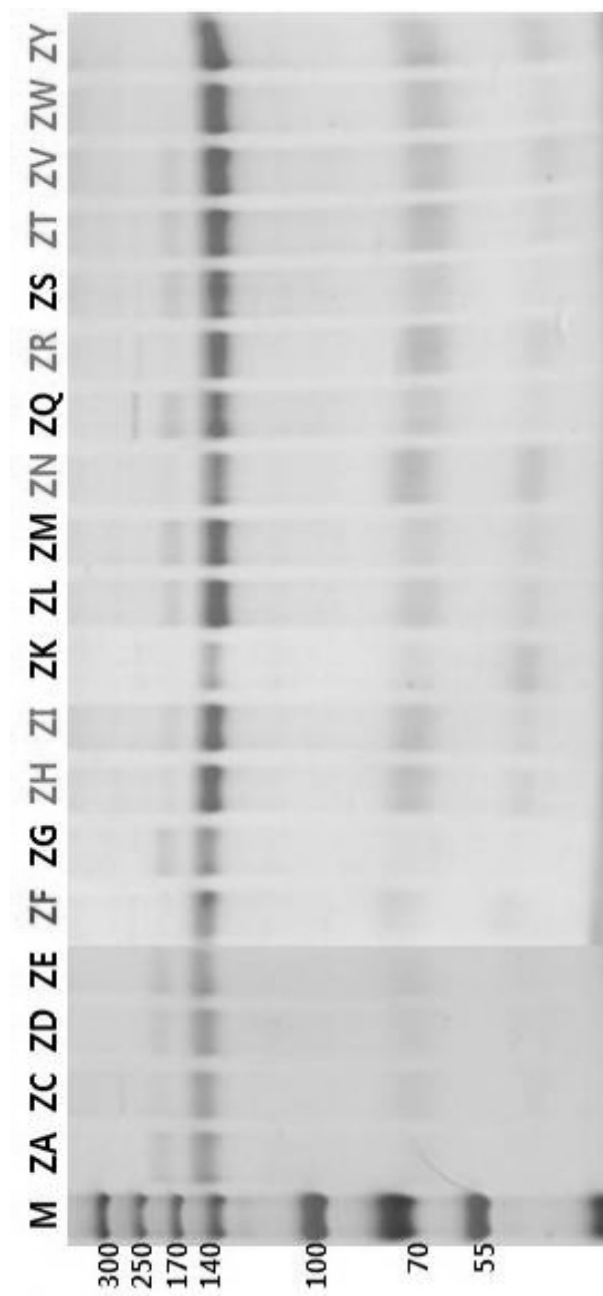
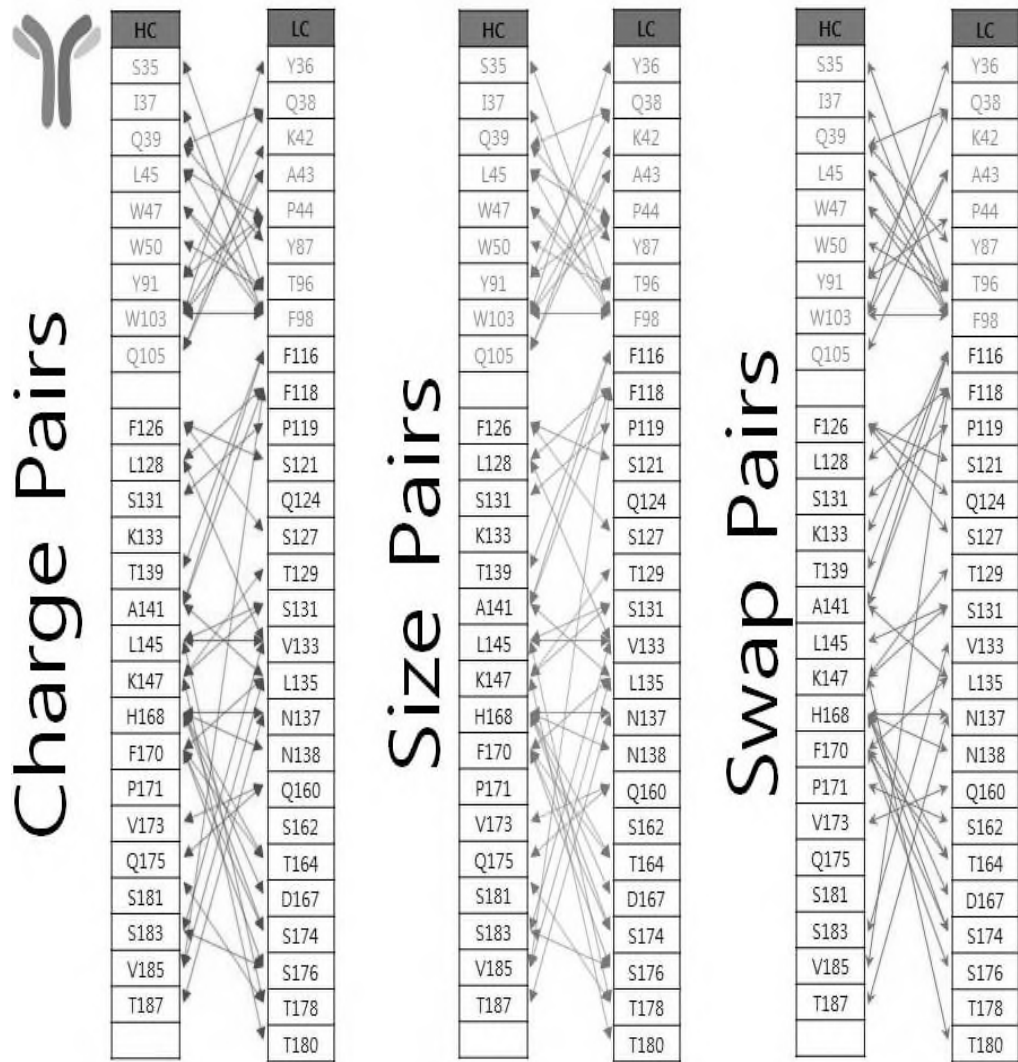
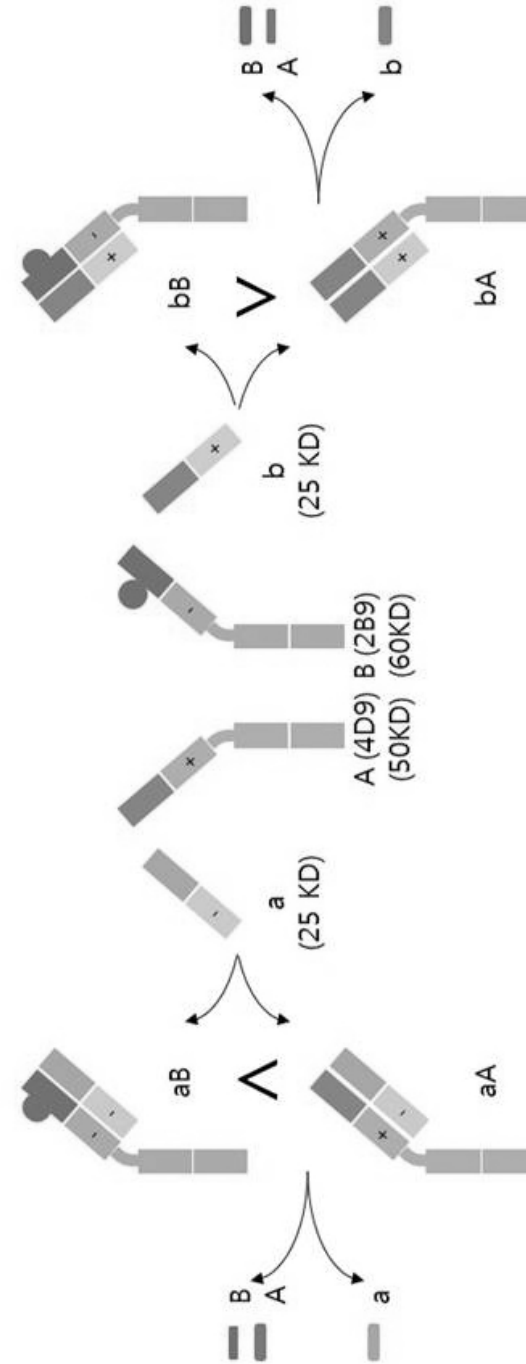


FIG. 10



Competitive Pairing (CPP) Assay

$$\begin{aligned} \text{CPP Score } (S^{\text{CPP}}) &= \frac{1}{2}(\mathbf{a}^{\text{CPP}} + \mathbf{b}^{\text{CPP}}) \\ \mathbf{a}^{\text{CPP}} &= 100(\mathbf{C}_{aA})/(\mathbf{C}_{aA} + \mathbf{C}_{aB}) = 100(\mathbf{C}_A)/(\mathbf{C}_A + \mathbf{C}_B) \\ \mathbf{b}^{\text{CPP}} &= 100(\mathbf{C}_{bB})/(\mathbf{C}_{bB} + \mathbf{C}_{bA}) = 100(\mathbf{C}_B)/(\mathbf{C}_A + \mathbf{C}_B) \end{aligned}$$



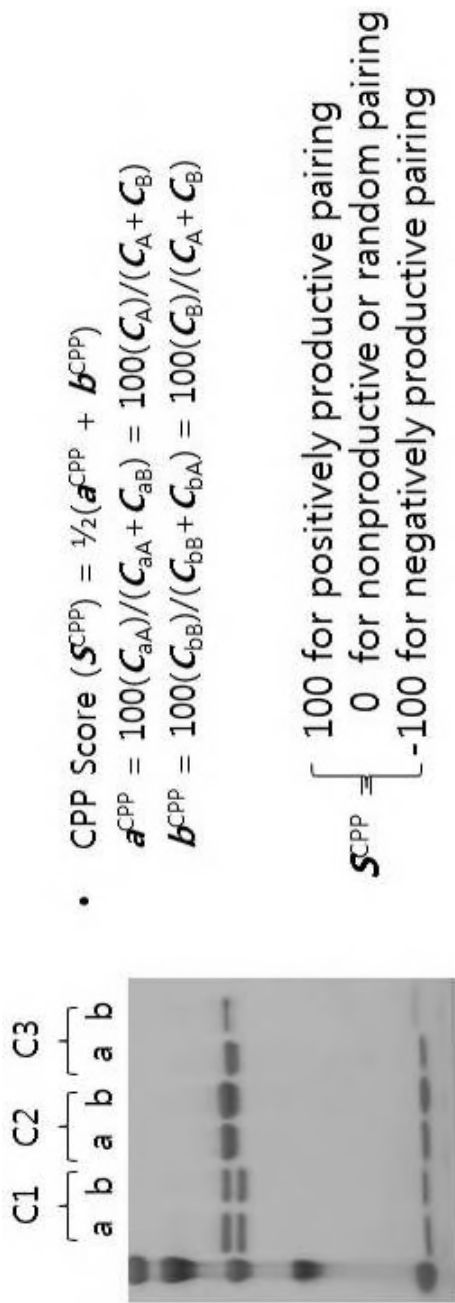


FIG. 12

	a	A (4D9)	B (2B9)	b	a^{CPP}	b^{CPP}	S^{CPP}
C1	A1R/Q38D/ L135Y/S176W	Q39K/S62E/ H172A/F174G	Q39V/S62K	A1D/Q38R	0	0	0
C2	S121C/C214V	F126C/C220V	-	-	-100	100	0
C3	Q38D/A43D/ S176K	Q39K/Q105K/ S183D	Q39D/Q105D/ S183K	Q38K/A43K/ S176D	-100	100	0

FIG. 13

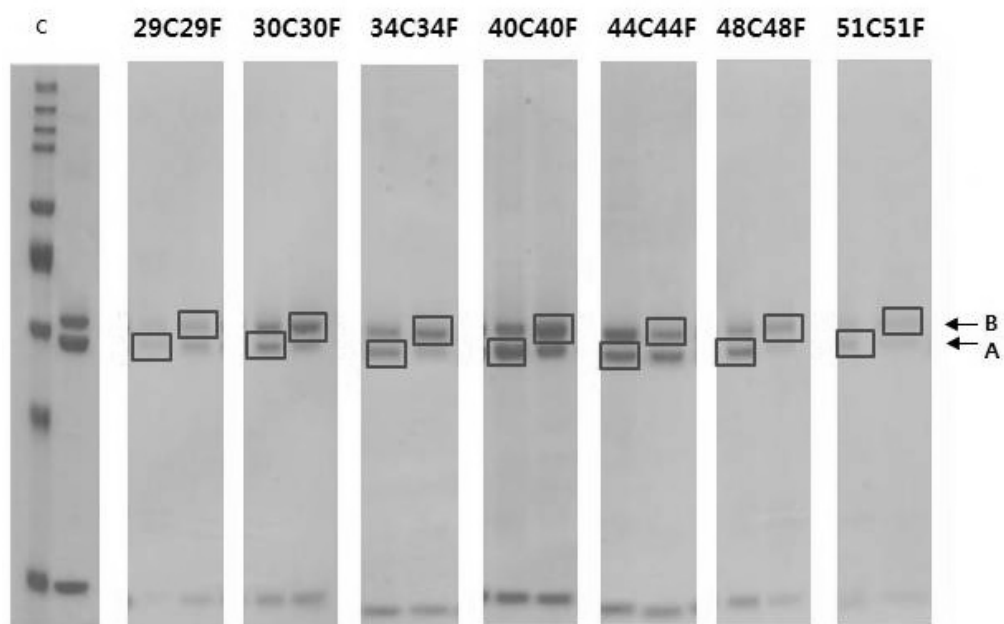


FIG. 14

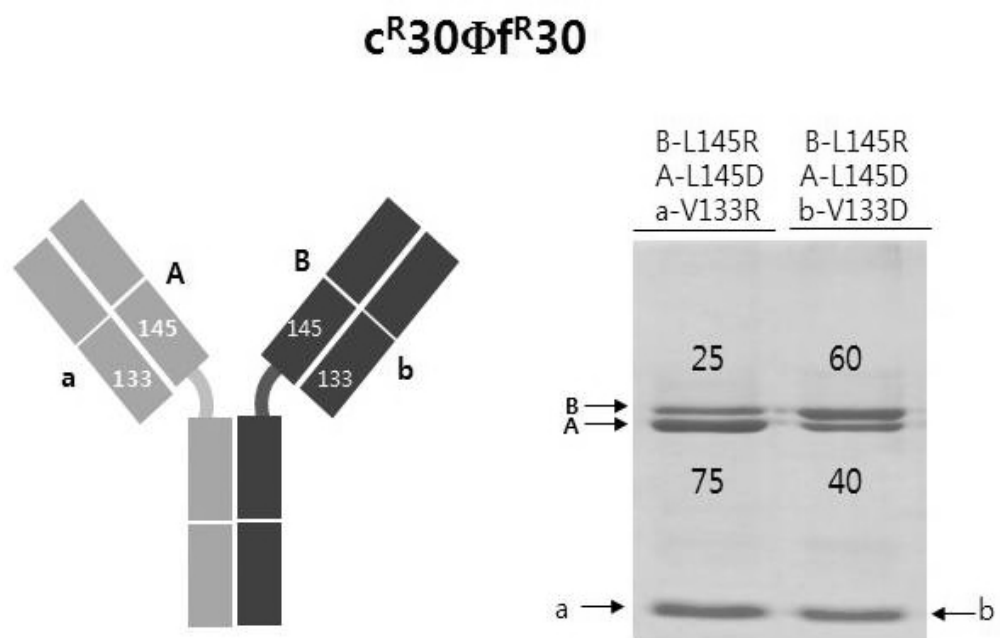


FIG. 15

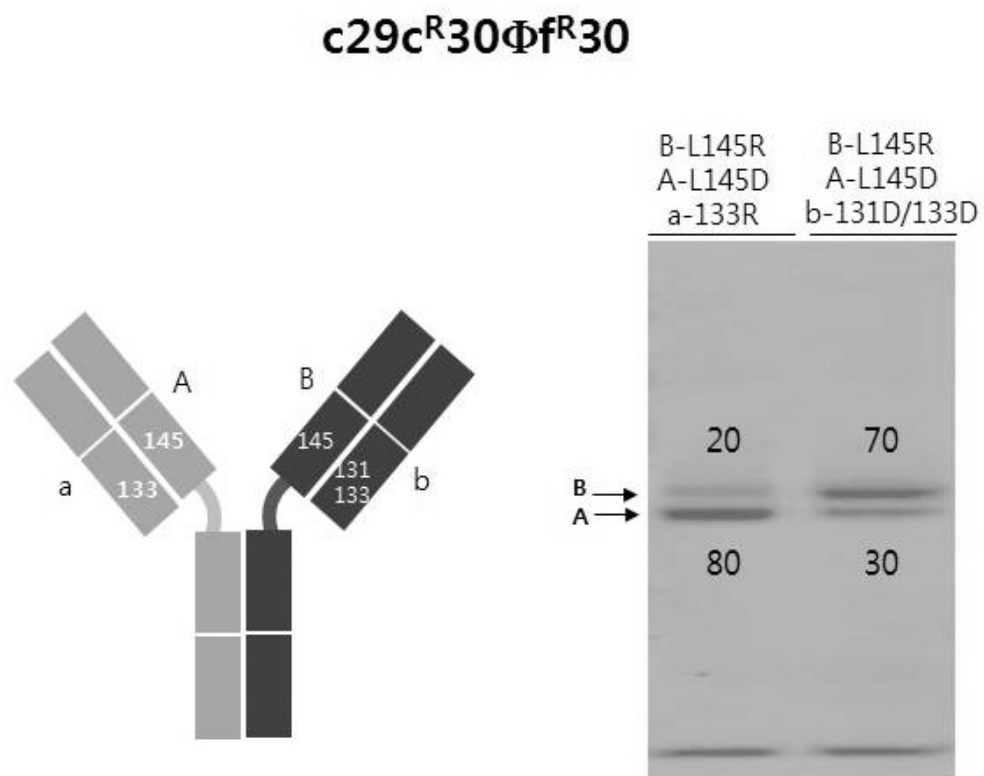


FIG. 16

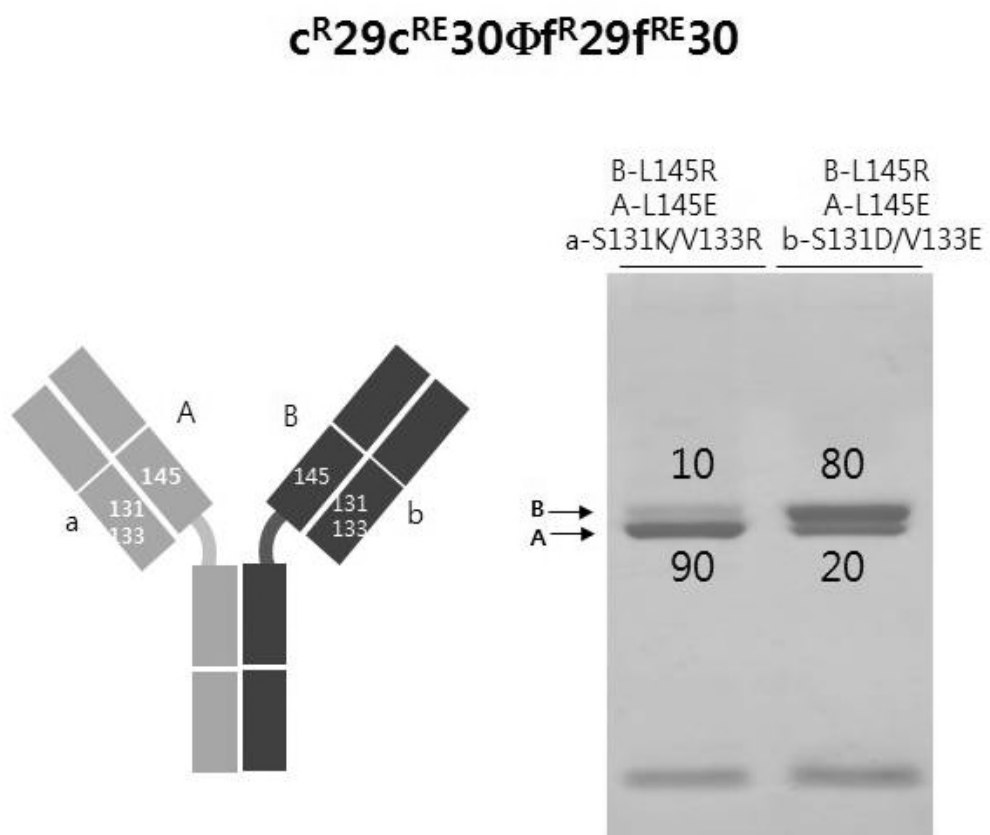


FIG. 17

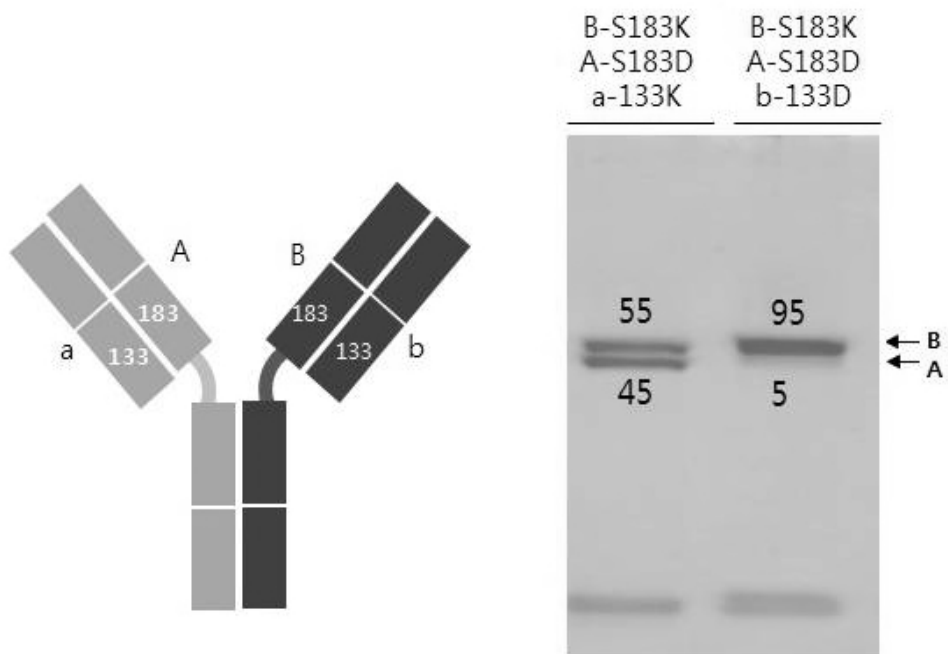
c48Φf48

FIG. 18

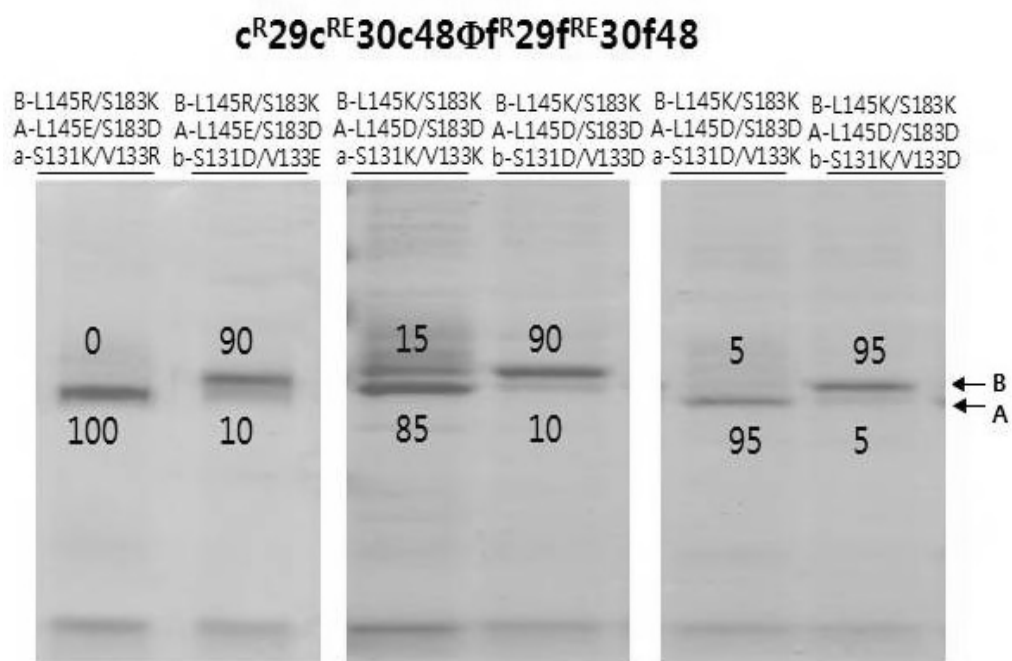


FIG. 19

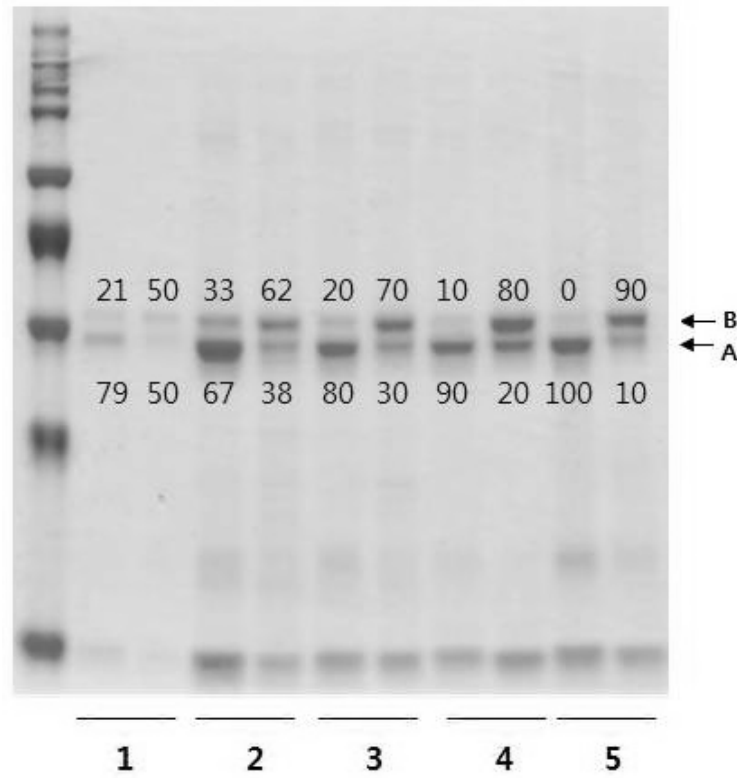


FIG.20

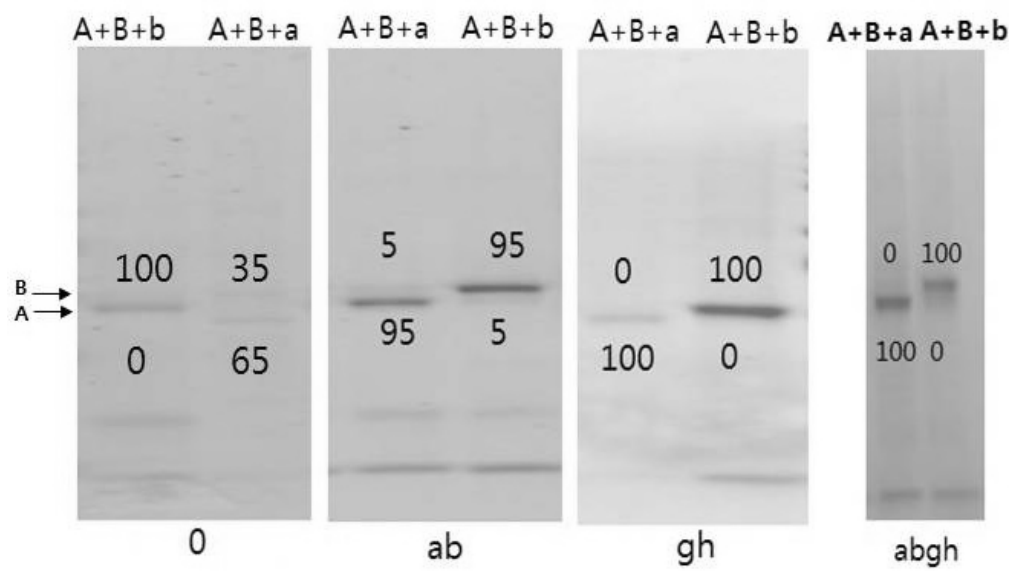


FIG. 21

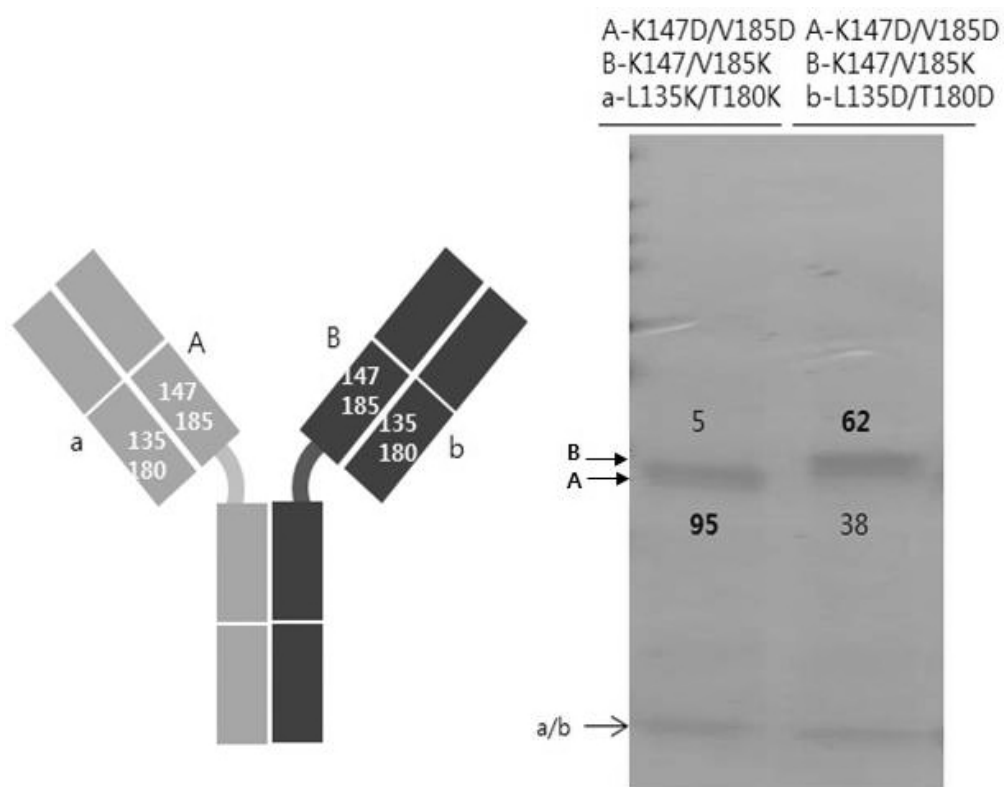


FIG. 22

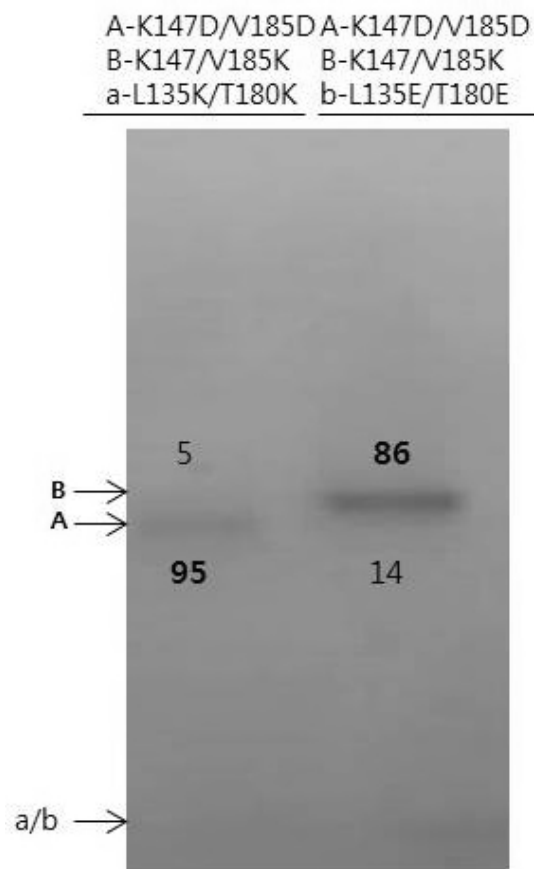


FIG. 23

c40Φf44

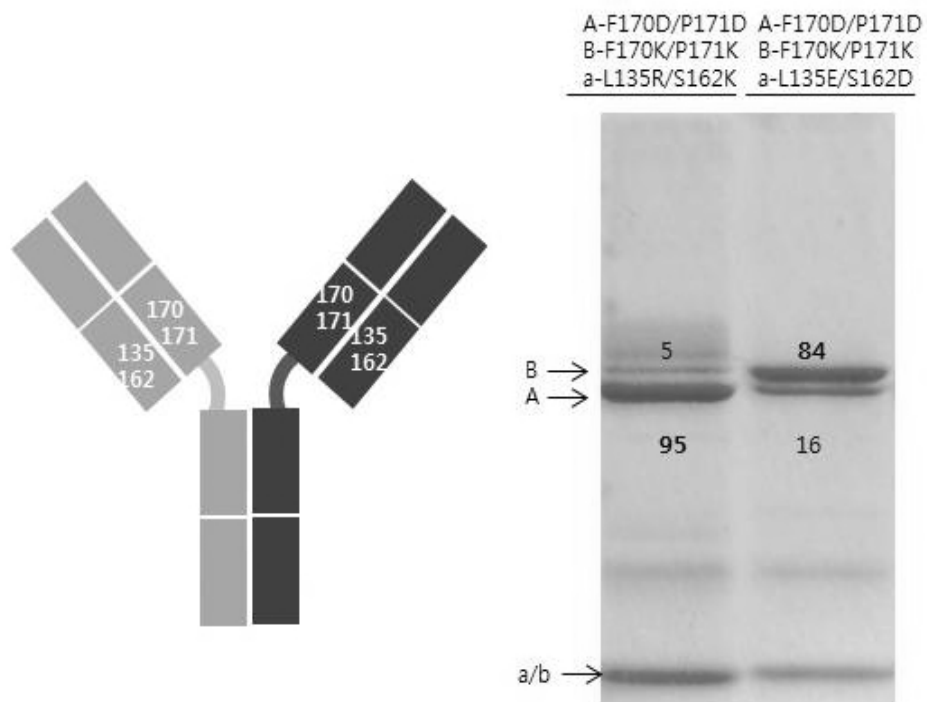


FIG. 24

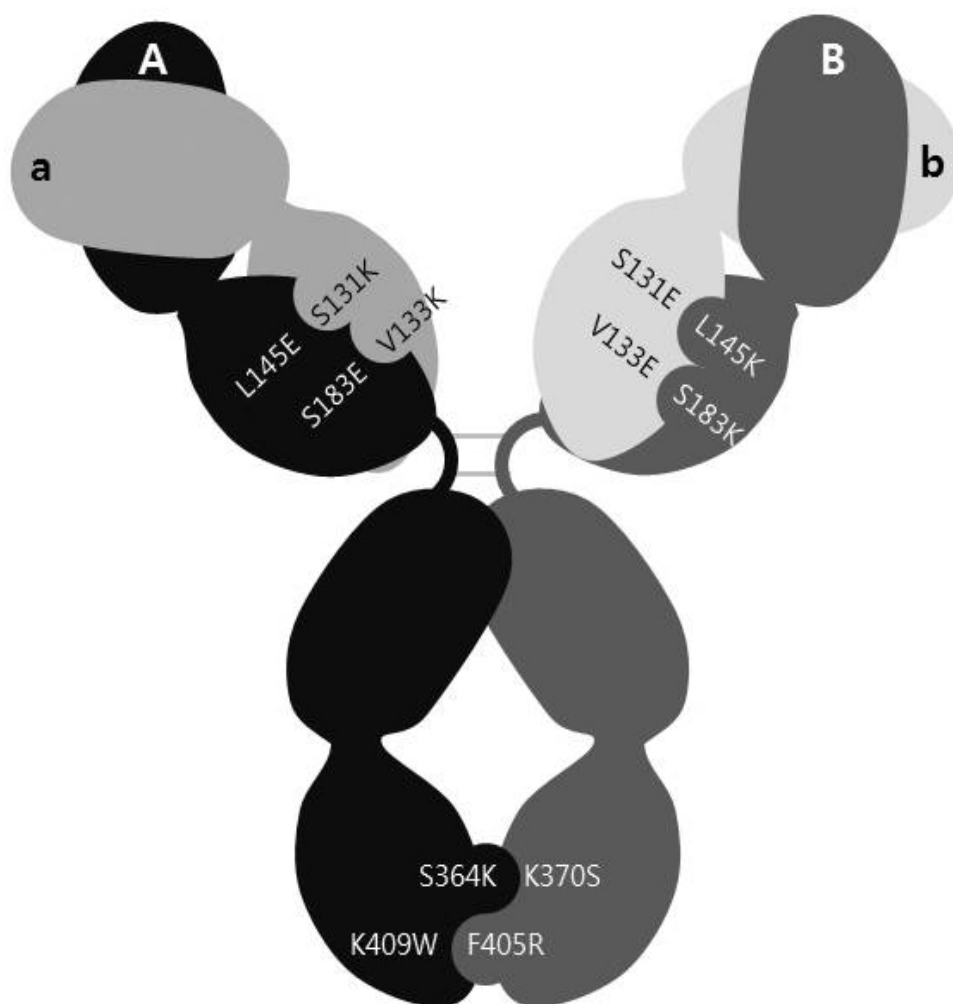


FIG. 25

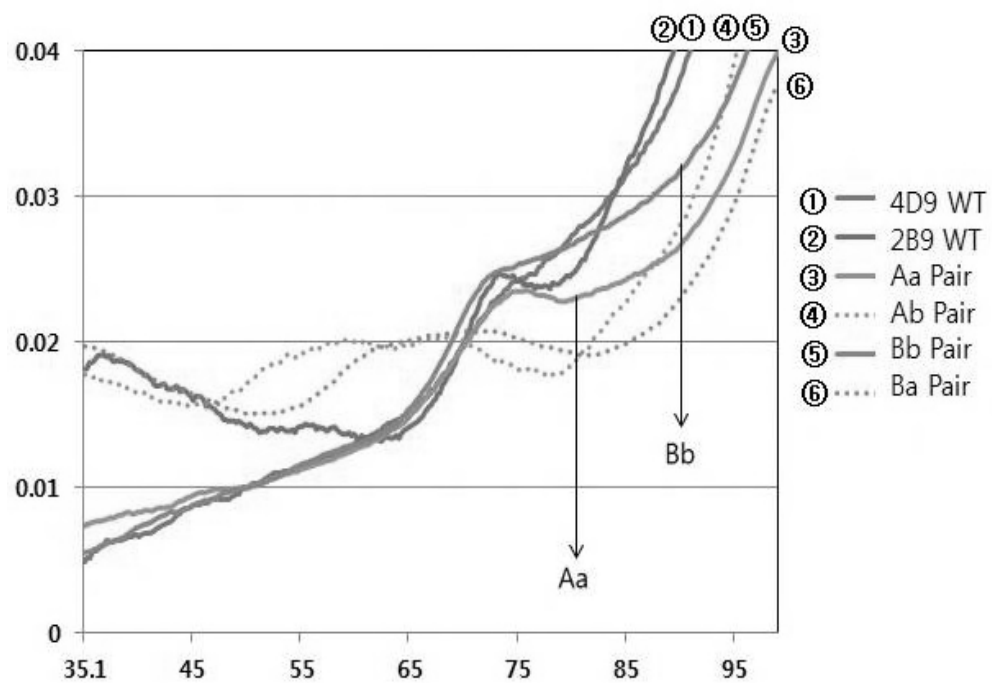


FIG. 26

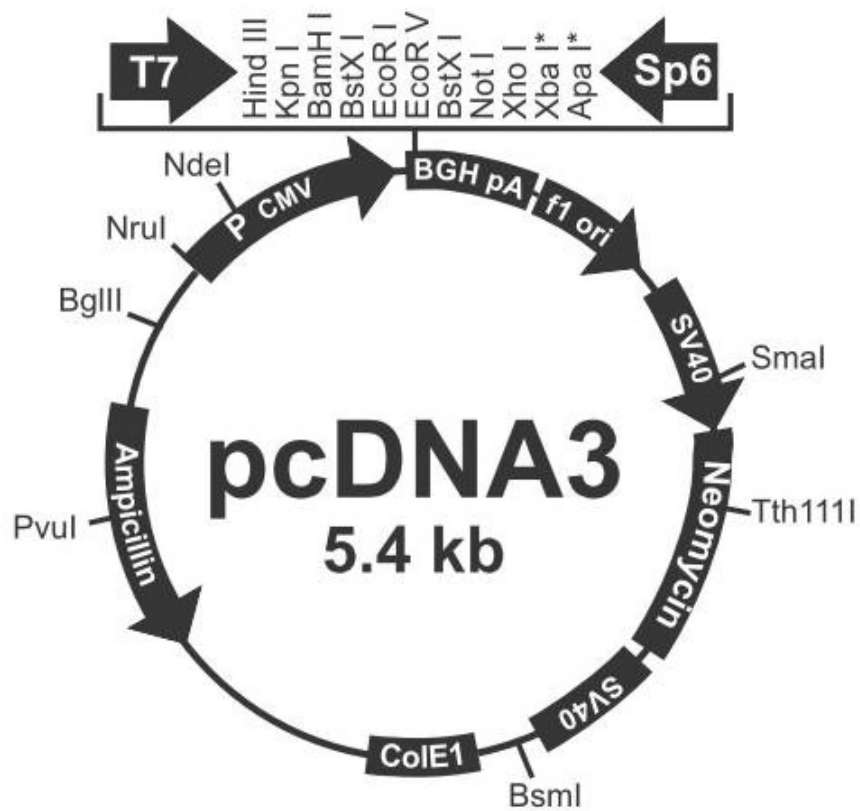


FIG. 27

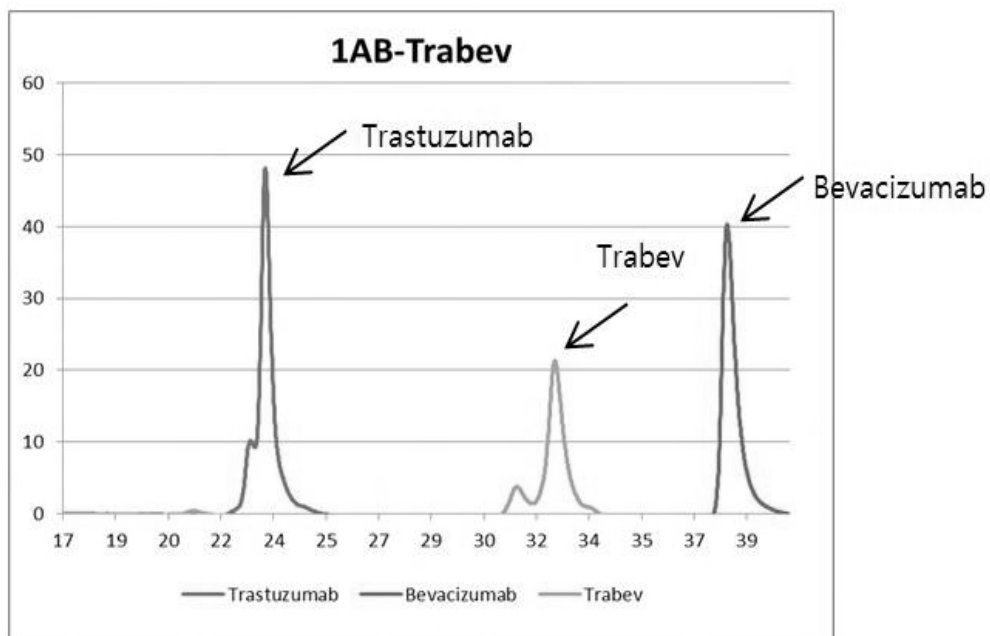
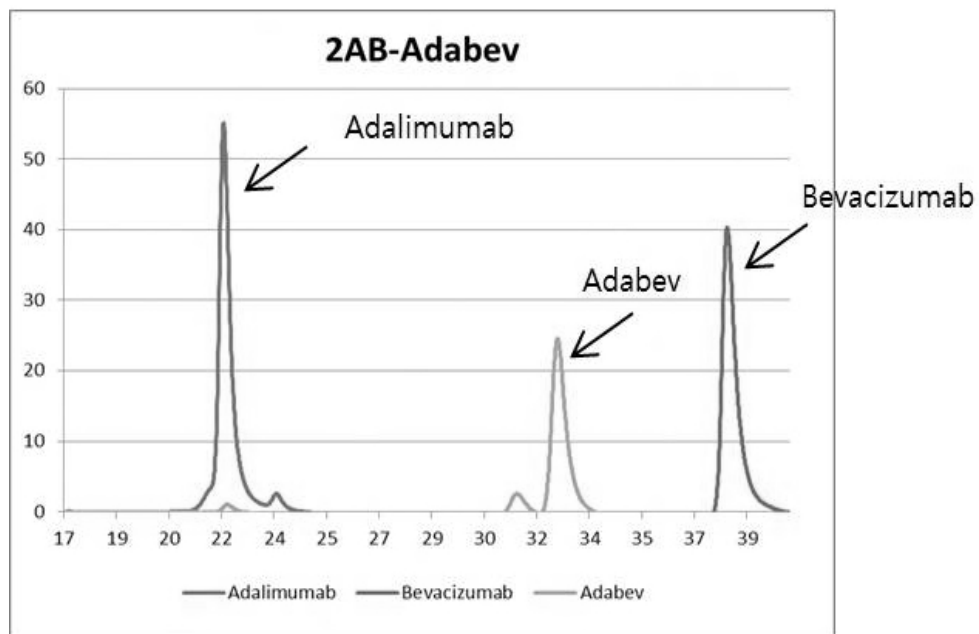


FIG. 28

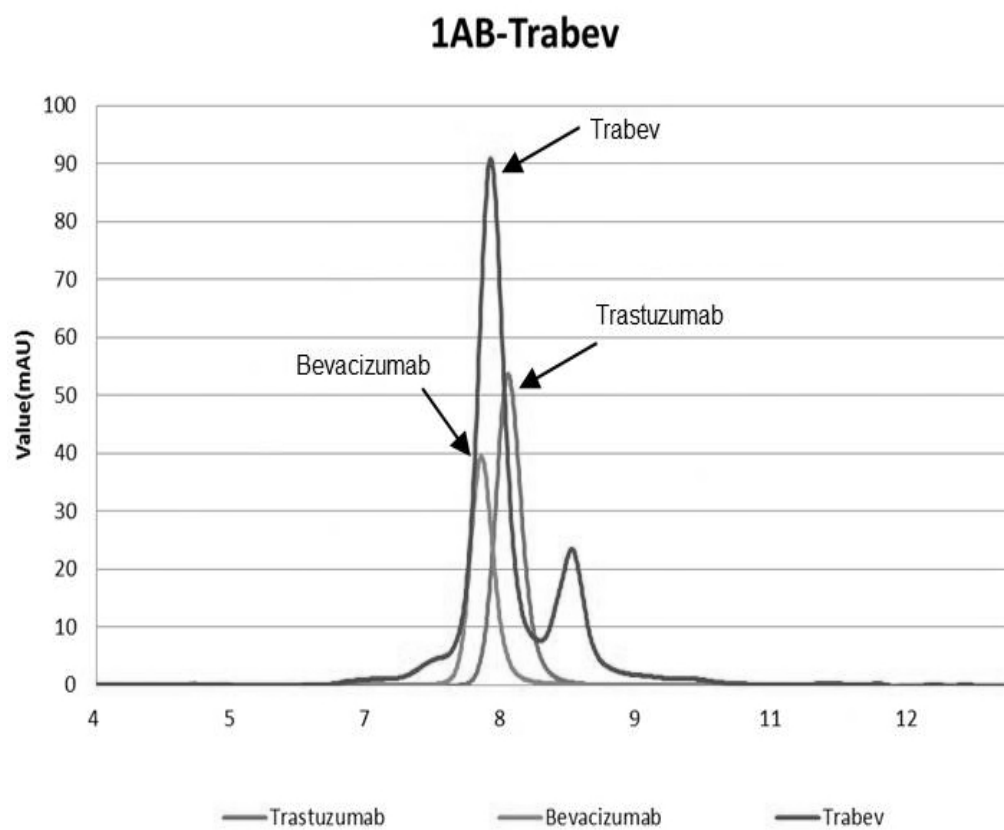


FIG. 29

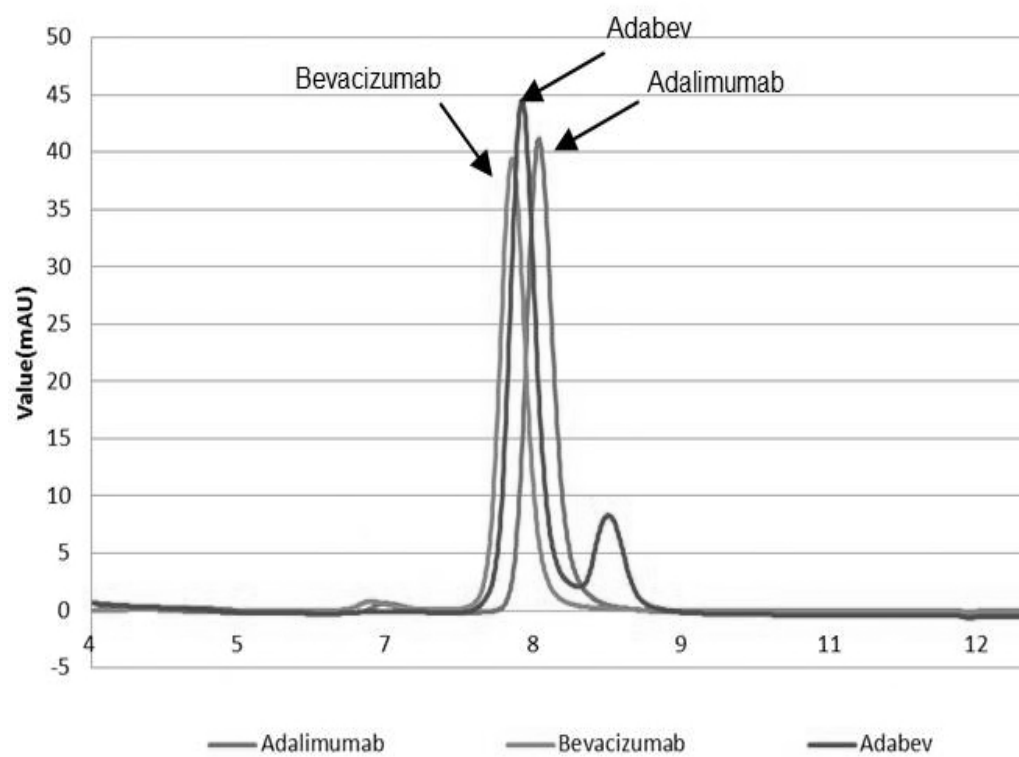
2AB-Adabev

FIG. 30

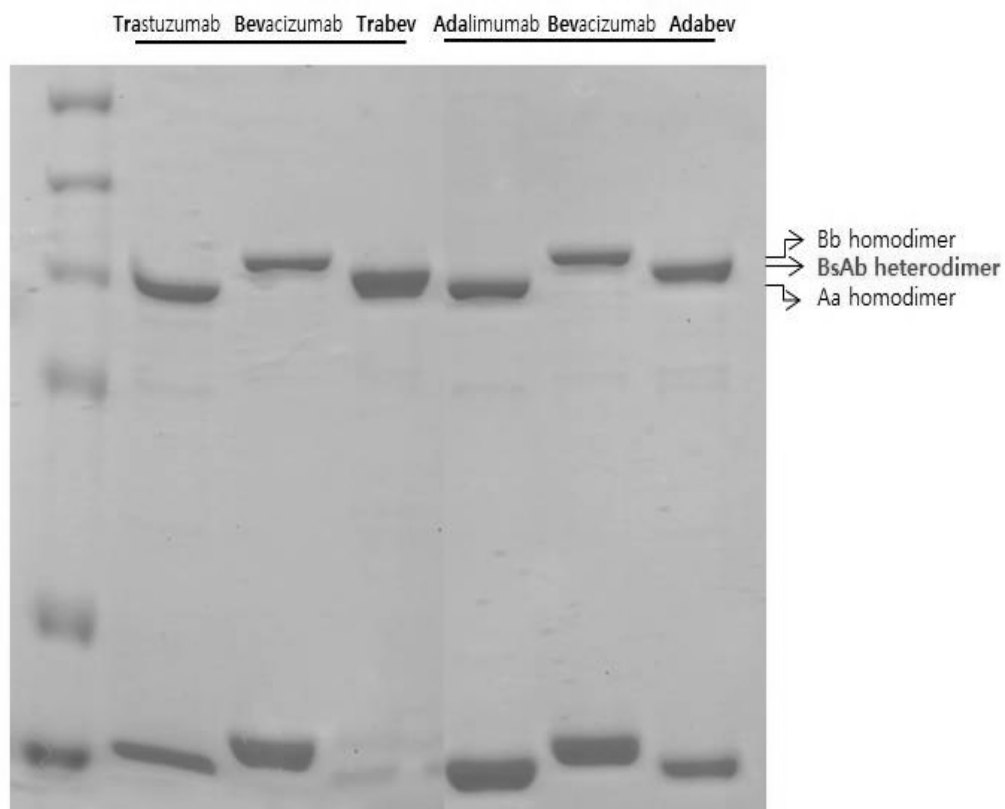


FIG. 31

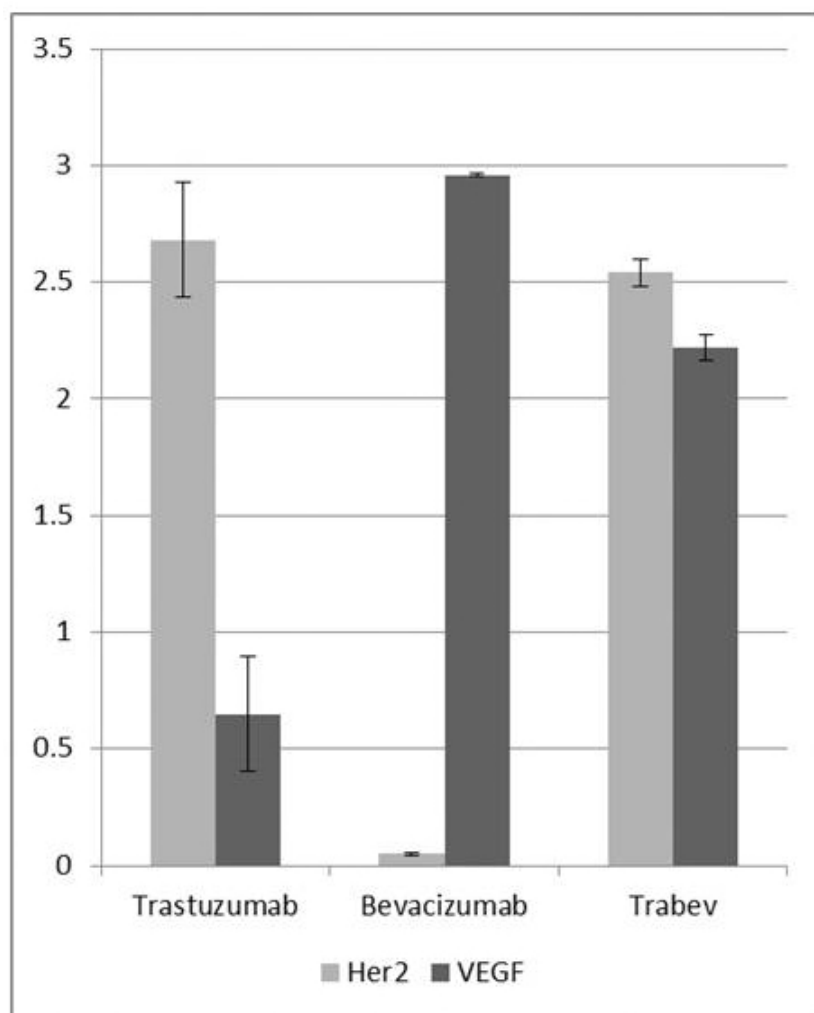
Trabev

FIG. 32

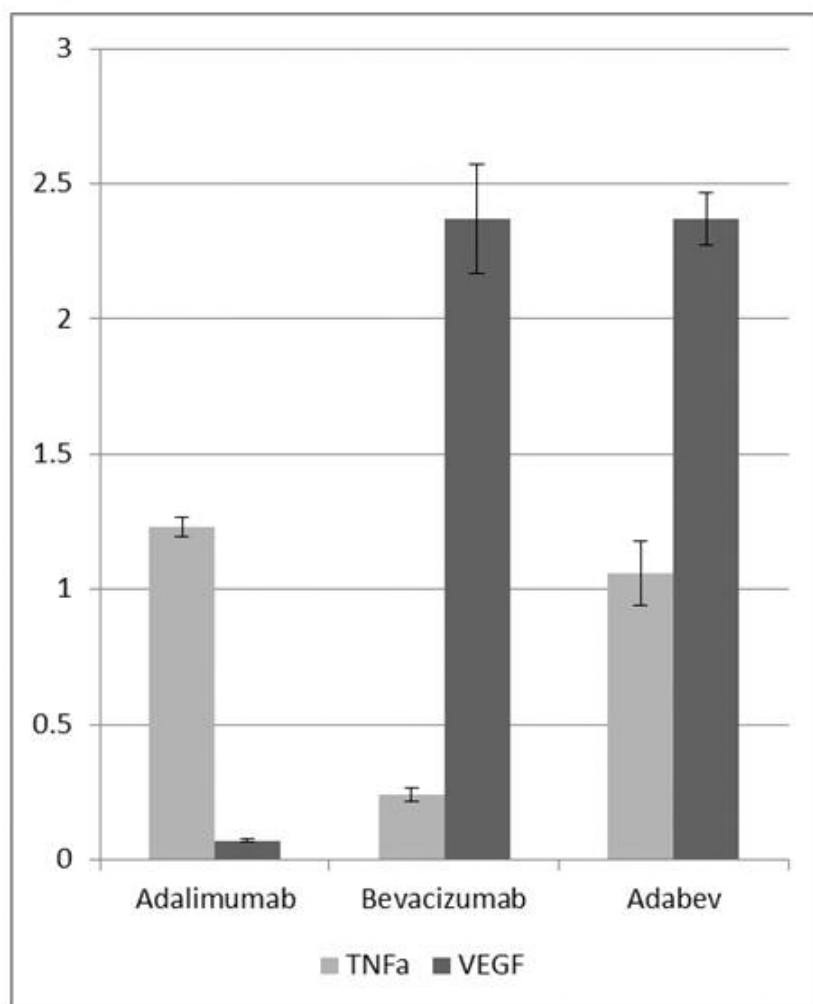
Adabev

FIG. 33a

Query : Human IgG1 Heavy Constant
 Subject : Human IgA1 Heavy Constant

Score	Expect	Method	Identities	Positives	Gaps
125 bits(315)	7e-38	Compositional matrix adjust.	108/341(32%)	159/341(46%)	17/341(4%)
Query 1	ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFP-EPVTVSWNSGALTSGVHTFPAVLQS	59			
Sbjct 1	AS P VFPL+ S + G + CLV+ +FP EP++V+W+ FP +	59			
Query 60	SG-LYSLSSVVTVPSSS-LGTQTYICNVNH--KPSNTKVDKRVKSCDKTHTCPPCPAP	115			
Sbjct 60	SG LY+ SS +T+P++ L ++ C+V H PS P + P	119			
Query 116	ELLGGPSVFLFFPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPR	175			
Sbjct 120	P + L P +D L+ S +TC + + + V F W + +A P	175			
Query 176	EEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLR	235			
Sbjct 176	E Y V SVL + W +GK + C + P+ T+SK+ G P+V+ LP	234			
Query 236	PSRDELTKNQ-VSLTCLVKGFPYPSDIAVEWESNGQ--PENNYKTTTPVLD-SDG--SPFL	289			
Sbjct 235	P +EL N+ V+LTCL +GF P D+ V W Q P Y T + S G +F++	294			
Query 290	YSRLTVDKSRNQGNVFSQSVMEALHNHYTQKSLSLSPGK	330			
Sbjct 295	S L V W++G+ FSC V HEAL +TQK++ GK	335			

K409 S364 K370

F405

FIG. 33b

Query : Human Immunoglobulin Light chain (Kappa)

Subject : Human Immunoglobulin Light chain (Lambda)

Score	Expect	Method	Identities	Positives	Gaps
151 bits(382)	2e-50	Compositional matrix adjust.	90/233(39%)	138/233(59%)	12/233(5%)
Query 7	VIMLLLLWVSGTCGDILLTQSPAILSVSPGERVSFSCRASQFVGSSIHWHYQQRTNGSPRL	66			
	+ + +L + +G+ L TQ P ++SVSPG+ S +C + + WYQ + SP L				
Sbjct 6	LFLGVLAYCTGSGVASVELTQ-PPLVSVSPGQTASITCSGDRGLGDNYACWYQLKPGQSPVL	64			
Query 67	LIKYASEMSGIPSRFSGSGSGTDFTLSINTVESEDIADYYCQ---QSHSWPFTFGSGTN	123			
	+I + SGIP R SGS SG TL+I+ ++ D A+YVCQ S SW FG GT				
Sbjct 65	VIIQDNRRPSGIPERISGSNSGNTATLTISGTQAMDEAEYVCQAWDSSTSW--VFGGGTK	122			
Query 124	LEV-KRTVAAPSVFIFPPSDEQLKSGTASVCLLNPFYPRKAVQWKVDNA-LQSGNSQE	181			
	L V + AAPSV +FPPS E+L++ A++CL+++FYP V WK D++ +++G E				
Sbjct 123	LTVLGQPKAAPSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAG--VE	180			
Query 182	SVTEQDSKDSYLSSTLTLSKADYERHKVYACEVTHQGLSSPVTKSFNRGEC	234			
	+ T ++ Y+ SS L+L+ ++ H+ Y+C+VTH+G S V K+ EC				
Sbjct 181	TTTPSKQSNKYYAASSYLSLTPEQWKSHRSYSCQVTHEG--STVEKTVAPTEC	231			

S131 & V133

FIG. 33c

C _g 1 Sequences		L145	S183
Human IgG1		ASTKGPSVFPPLAPSSKSTSGGTAALGCLWKDYFPEPVTVSWNSGALTSGVHTFPVAVLQSSGLYSLSLSVVTVVPSSSLGTQTTCNVNHHKPSNTKVDKKV	
Human IgG2		ASTKGPSVFPPLAPCSRSTSESTAALGCLWKDYFPEPVTVSWNSGALTSGVHTFPVAVLQSSGLYSLSLSVVTVVPSSNFGTQTTCNVDDHKPSNTKVDKTV	
Human IgG3		ASTKGPSVFPPLAPCSRSTSGGTAALGCLWKDYFPEPVTVSWNSGALTSGVHTFPVAVLQSSGLYSLSLSVVTVVPSSSLGTQTTCNVNHHKPSNTKVDKRV	
Human IgG4		ASTKGPSVFPPLAPCSRSTSESTAALGCLWKDYFPEPVTVSWNSGALTSGVHTFPVAVLQSSGLYSLSLSVVTVVPSSSLGTKTTCNVDDHKPSNTKVDKRV	
Mouse IgG1		AKTTPPSVYPLAPGSAAQTNMVTILGCLWKGYFPEPVTVTWNSGSLSSGVHTFPVAVLQSDYTLSSSVTVPPSPRPSETVTCNVVHPASSSTKVDKKI	
Mouse IgG2 ^{a,b}		AKTTAPSVYPLAPVCGGTGSSVTILGCLWKGYFPEPVTTLTWNSGSLSSGVHTFPALLQSGLYTLSSSVTVTSNTWPSQTTCNVVHPASSSTKVDKKI	
Mouse IgG2 ^a		AKTTAPSVYPLAPVCGDTTGSSTVLGCLWKGYFPEPVTTLTWNSGSLSSGVHTFPVAVLQSDYTLSSSVTVTSSTWPSQSITTCNVVHPASSSTKVDKKI	
Mouse IgG2 ^b		AKTTPPSVYPLAPCGGDTTGSSTVSGCLWKGYFPEPVTVTWNSGSLSSSVHTFPALLQSGLYTMSSSVTVPPSSTWPSQTTCNVVHPASSSTTVDDKLL	
Mouse IgG3		_TTTAPSVYPLVPGCSDTSGSSVTILGCLWKGYFPEPVTWKWNYGALSSGVHTVSSVLOSGFVSLSSLVTVPPSSTWPSQTTCNVVHPASKTELKRI	
Rat IgG1		AETTAPSVYPLAPGTALKNSMVTILGCLWKGYFPEPVTVTWNSGALSSGVHTFPVAVLQSGLYTLSSSVTVPPSSTWSSQAVTCNVVHPASSSTKVDKKI	
Rat IgG2 ^a		AETTAPSVYPLAPGTALKNSMVTILGCLWKGYFPEPVTVTWNSGALSSGVHTFPVAVLQSGLYTLSSSVTVPPSSTWPSQTTCNVVHPASSSTKVDKKI	
Rat IgG2 ^b		AQTTAPSVYPLAPCGGDTTSSVTILGCLWKGYFPEPVTVTWNSGALSSDVHTFPVAVLQSGLYTLSSSVT_SSTWPSQTTCNVVHPASSSTKVDKKV	
Rat IgG2 ^c		ATTAPSVYPLVPGCGTSGSLVTILGCLWKGYFPEPVTWKWNSGALSSGVHTFPVAVLQSGLYTLSSSVTVPPSSTWSSQTTCNVVHPATKSNLIKRI	

FIG. 33d

C _H 3 Sequences		S364 K370	F405 K409
Human IgG1	QQPREQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	QQPREQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	QQPREQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Human IgG2	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPMLDSGSFFLYSKLTVDKSRWQQGNV	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPMLDSGSFFLYSKLTVDKSRWQQGNV	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPMLDSGSFFLYSKLTVDKSRWQQGNV
Human IgG3	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPMLDSGSFFLYSKLTVDKSRWQQGNV	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPMLDSGSFFLYSKLTVDKSRWQQGNV	QQPREQVYITLPPSRDEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPMLDSGSFFLYSKLTVDKSRWQQGNV
Human IgG4	QQPREQVYITLPPSQEEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	QQPREQVYITLPPSQEEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	QQPREQVYITLPPSQEEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Mouse IgG1	GRPKAPQVYITLPPPKQMAKDQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPIMNTINGSYPTYSKLTVDKSRWQQGNV	GRPKAPQVYITLPPPKQMAKDQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPIMNTINGSYPTYSKLTVDKSRWQQGNV	GRPKAPQVYITLPPPKQMAKDQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPIMNTINGSYPTYSKLTVDKSRWQQGNV
Mouse IgG2 ^{ab}	GPVRAPQVYITLPPPAEEMTKKEFSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GPVRAPQVYITLPPPAEEMTKKEFSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GPVRAPQVYITLPPPAEEMTKKEFSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Mouse IgG2 ^{aa}	GSVRAPQVYITLPPPEEMTKKQVLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GSVRAPQVYITLPPPEEMTKKQVLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GSVRAPQVYITLPPPEEMTKKQVLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Mouse IgG2 ^b	GLVRAPQVYITLPPPAEQLSRKDVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GLVRAPQVYITLPPPAEQLSRKDVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GLVRAPQVYITLPPPAEQLSRKDVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Mouse IgG3	GRATPQVYITLPPPREQMSKKVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GRATPQVYITLPPPREQMSKKVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GRATPQVYITLPPPREQMSKKVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Rat IgG1	GRTQVPHVYITLPPSTHEEMTQNEVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GRTQVPHVYITLPPSTHEEMTQNEVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GRTQVPHVYITLPPSTHEEMTQNEVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Rat IgG2 ^a	GTPRGQVYITLPPAPPEEMTQSQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GTPRGQVYITLPPAPPEEMTQSQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GTPRGQVYITLPPAPPEEMTQSQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Rat IgG2 ^b	GLVRKQVYITLPPVVGPPTEQLTEQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GLVRKQVYITLPPVVGPPTEQLTEQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GLVRKQVYITLPPVVGPPTEQLTEQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV
Rat IgG2 ^c	GKARTPQVYITLPPPREQMSKNKVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GKARTPQVYITLPPPREQMSKNKVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV	GKARTPQVYITLPPPREQMSKNKVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPPVLDSDGSFFLYSKLTVDKSRWQQGNV

FIG. 34

c34Φf51

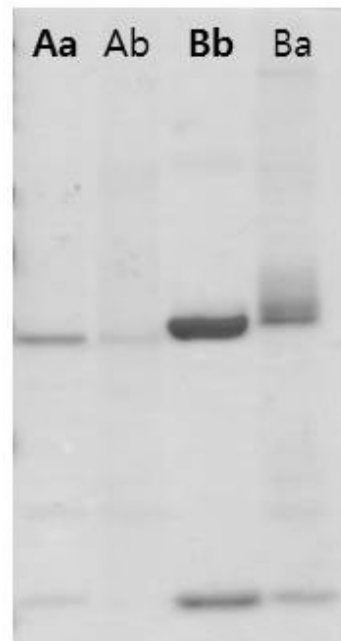


FIG. 35

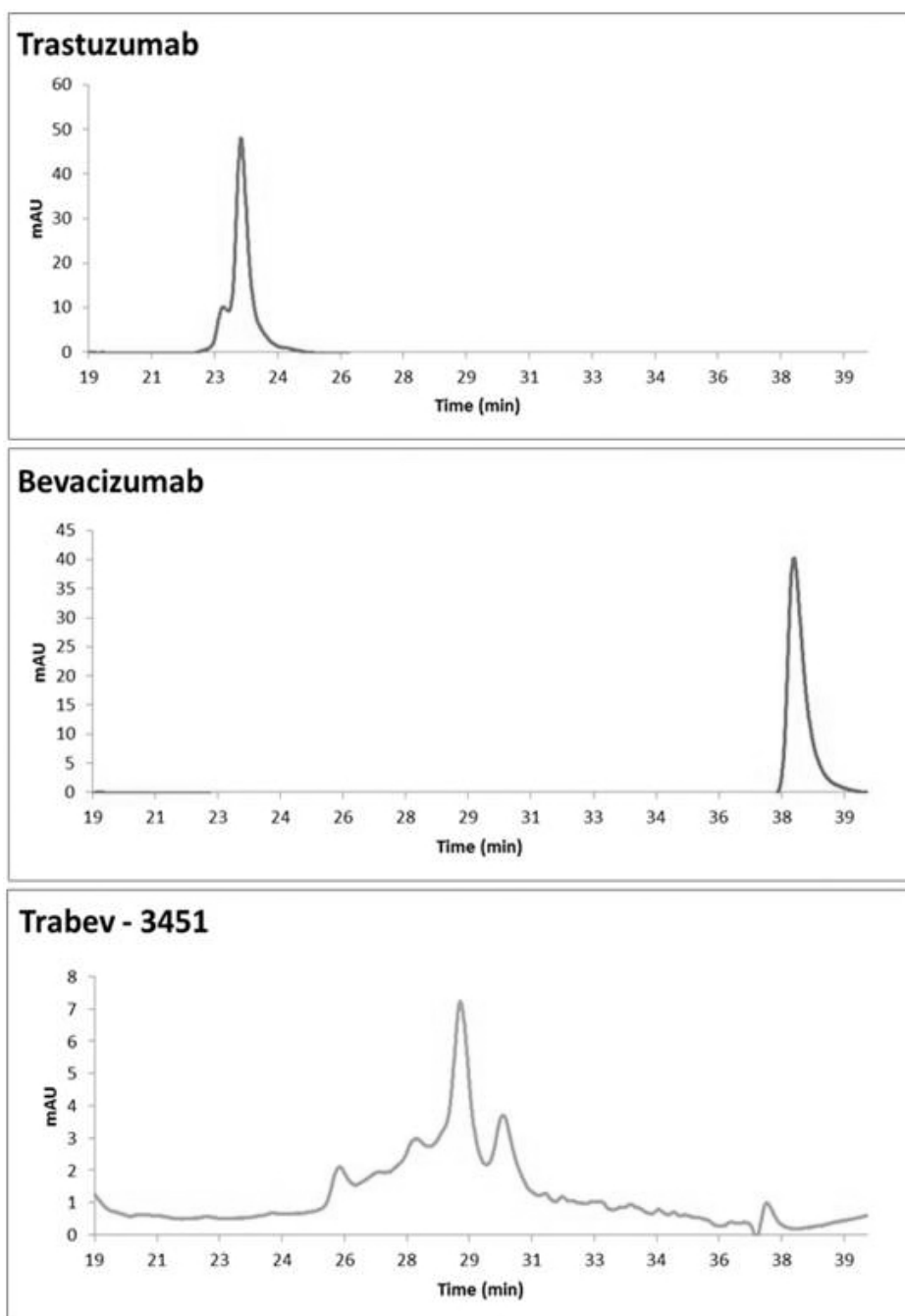


FIG. 36

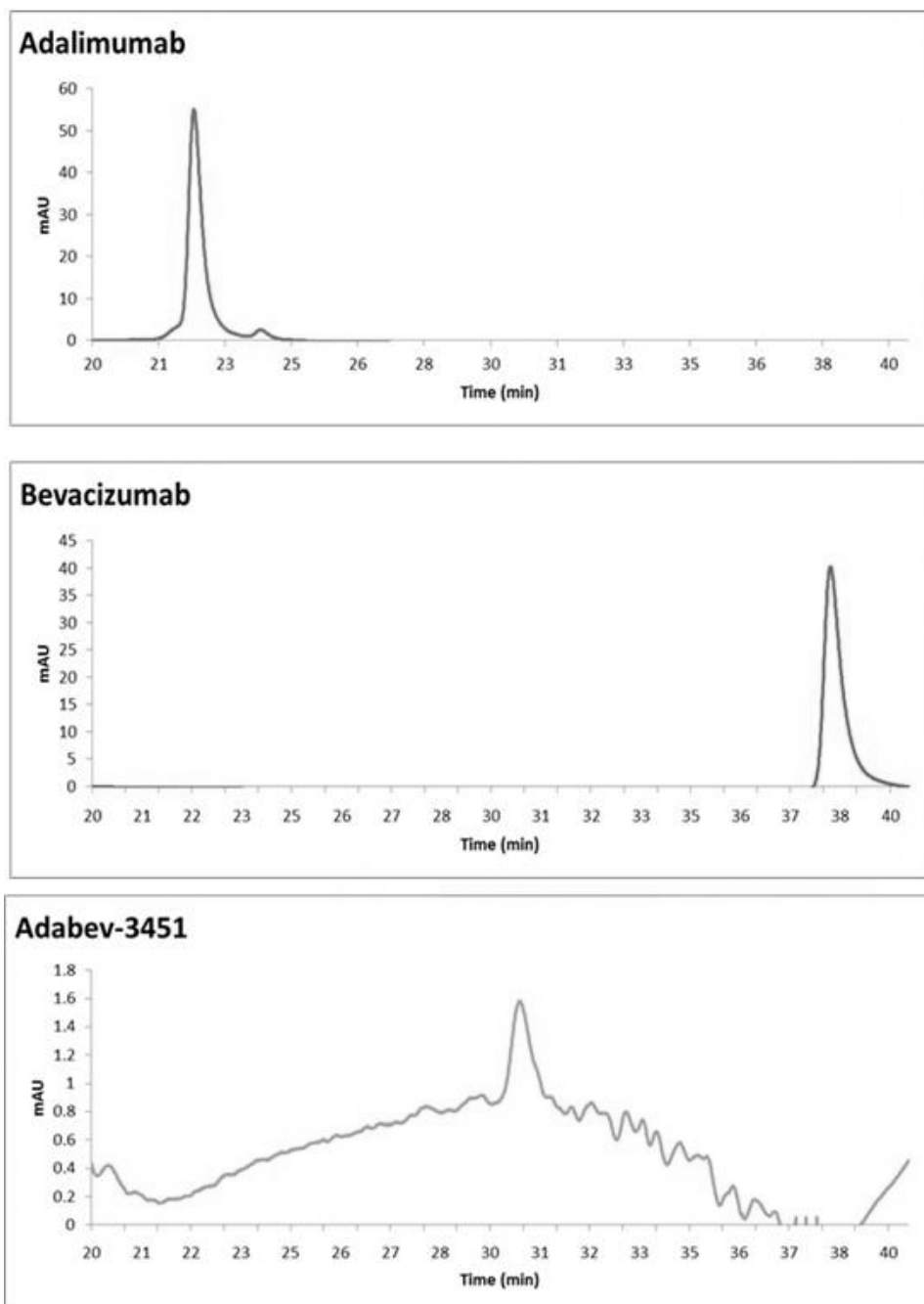


FIG. 37

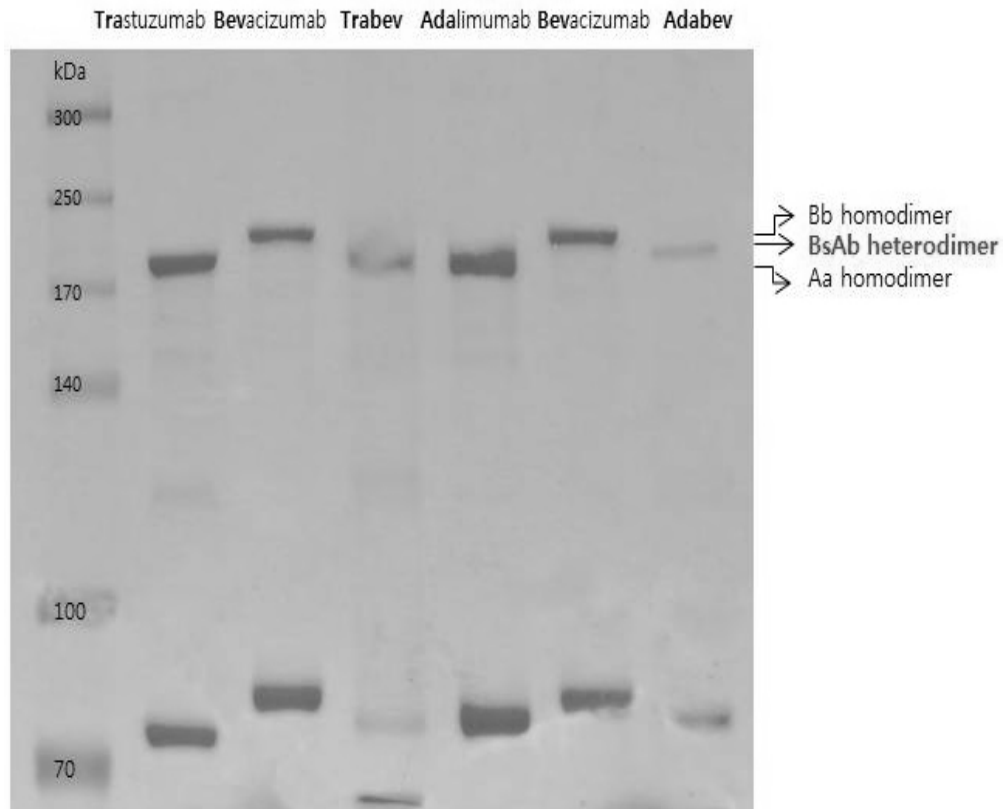


FIG. 38

c40Φf44



FIG. 39

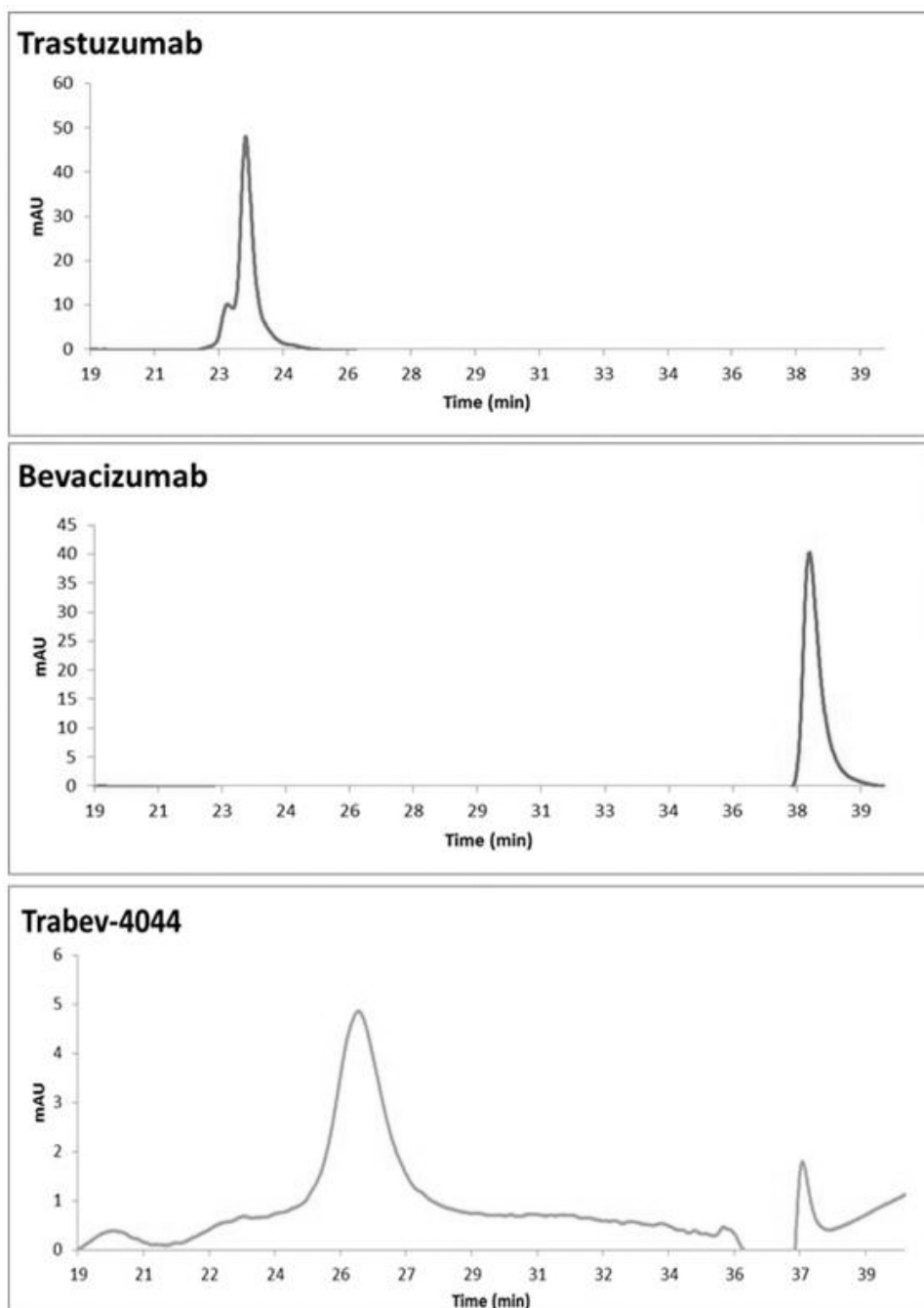


FIG. 40

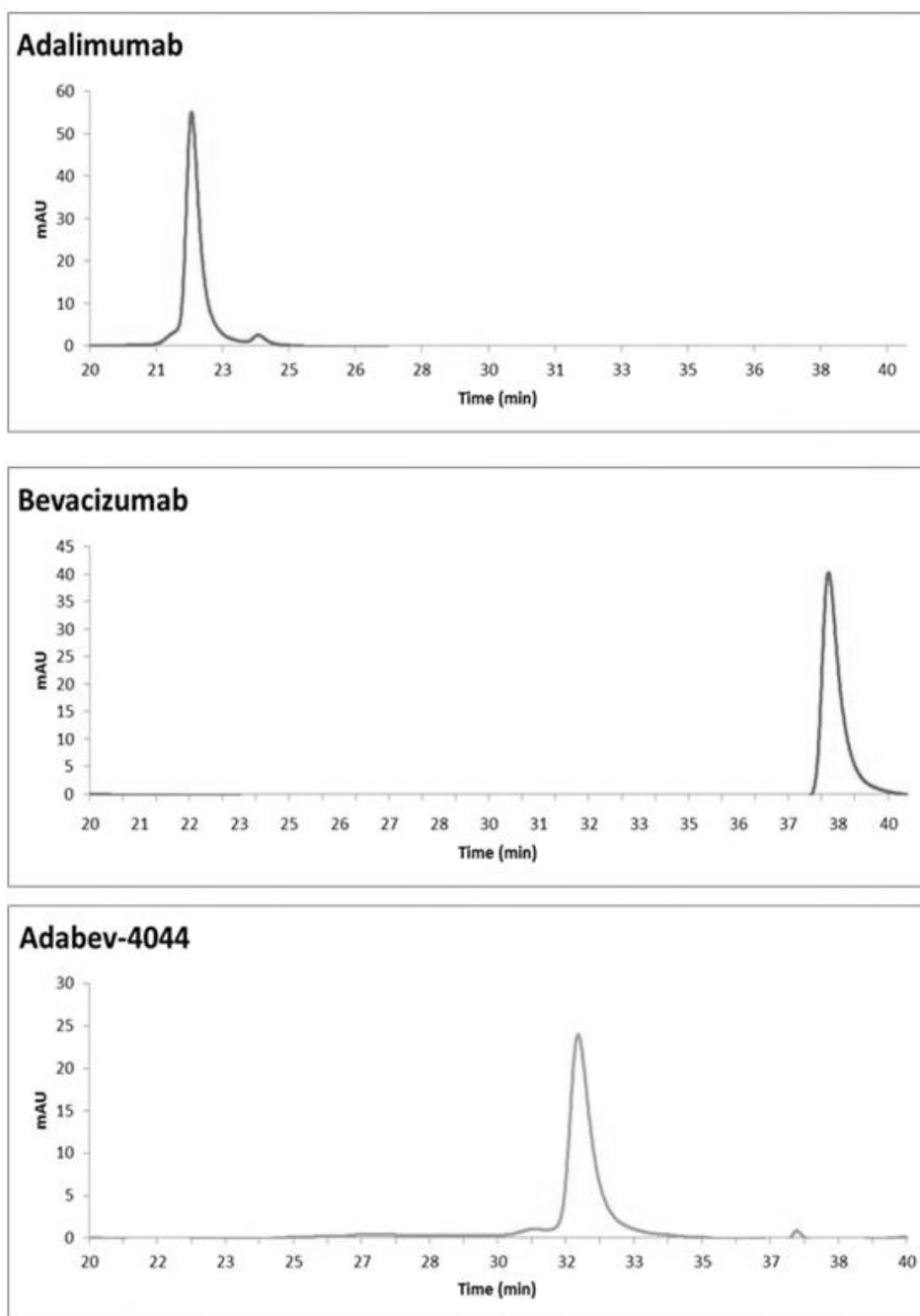


FIG. 41

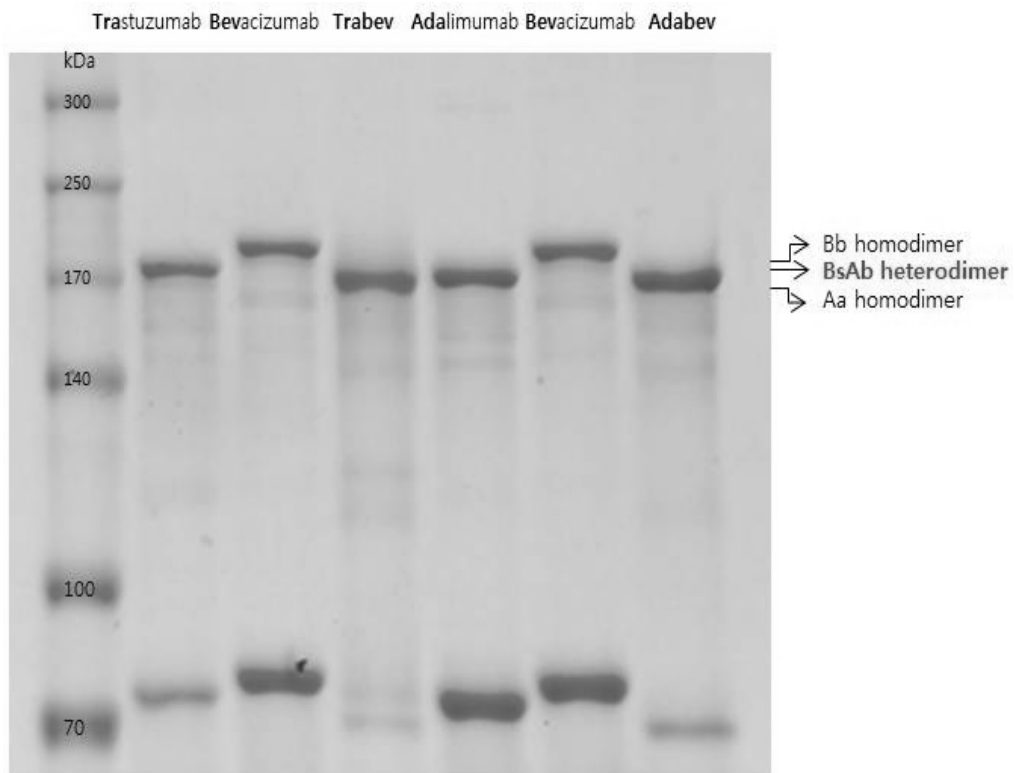


FIG. 42

